

THE IRON AGE

THURSDAY, MAY 19, 1892.

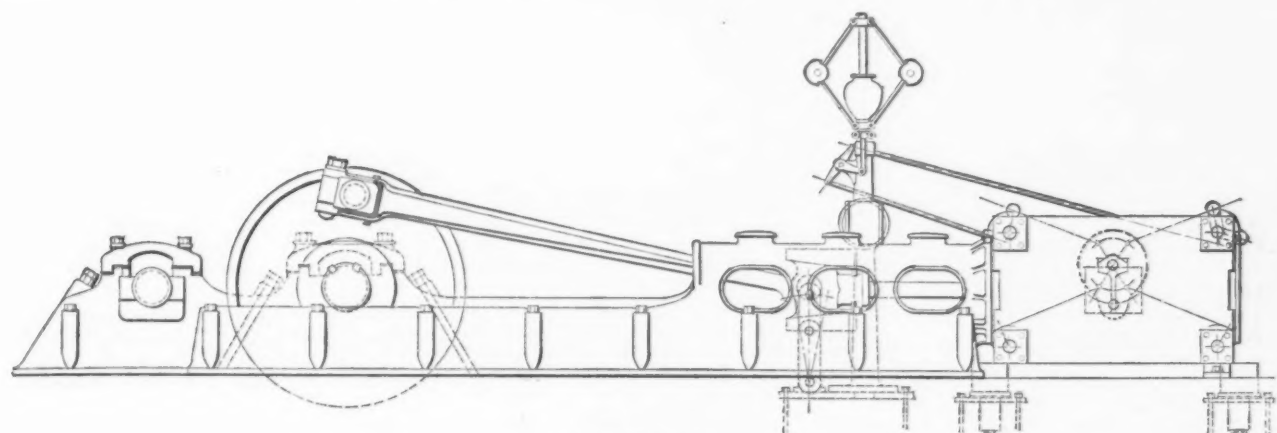
The McKnight Corliss Mill Engine.

The accompanying drawings represent a Corliss engine now being built by Wharton McKnight of Pittsburgh, Pa., for the Aliquippa Steel Company. It has a 32 x 72 inch cylinder, and is made with a "trunk" or bored guide for the cross-head. The bed plate is cast in box form, and is 30½ inches deep and 31½ inches wide on the bottom, of about 1½ inches thickness throughout. It has the main shaft pillow block and the jacket shaft pillow

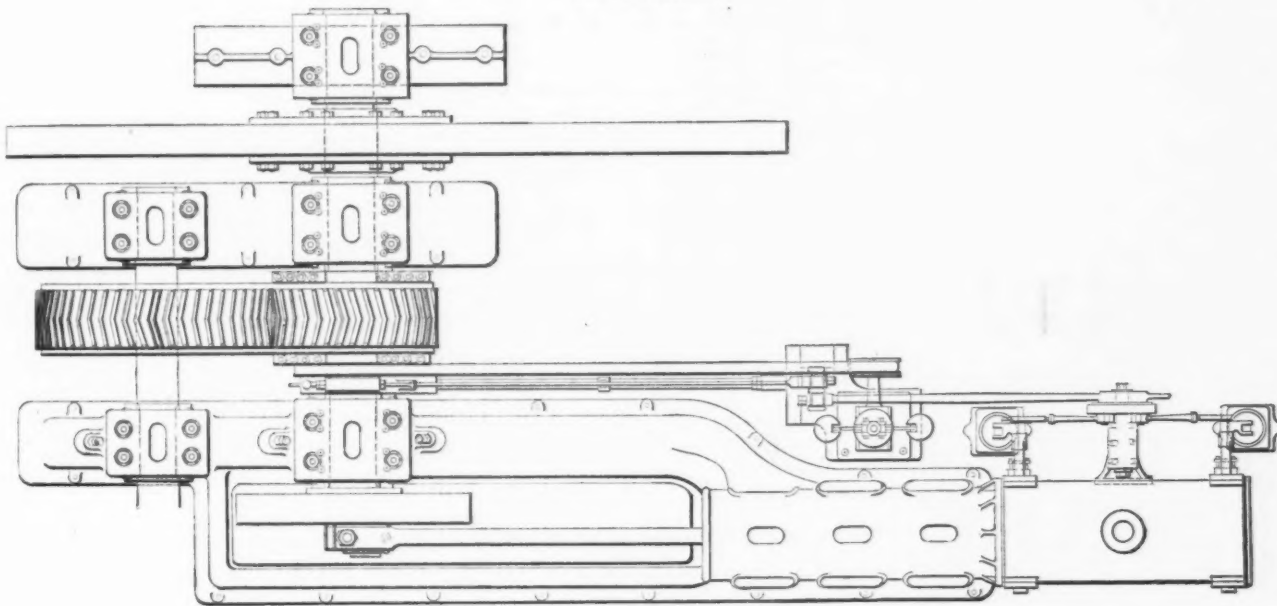
rear end there is a plate with V-slides bolted to the foundation, which carries the cylinder if there is any tendency to droop, but allows of expansion from heat, which is neglected in many Corliss engines as usually built, this end being generally bolted down to the foundation, so that the expansion must distort something.

The crosshead is of a similar type to the usual Corliss, but is provided with gibs that are inclined on the sides nearest the pin, and these are set up by two studs with nuts and a jam bolt. The surfaces of the gibs that touch the guide are babbitted,

open, the brasses being held in place by a bolt and block, and set up by a wedge and bolt, the wedge having much greater bearing upon the brass than has the usual narrow key of the other kind of strap end. The wedge bolt is jammed by another similar bolt meeting it from the opposite side of the rod. The crosshead end of the rod is solid, the brasses being set up by wedge and screws as at the other end of the rod. The crosshead pin is 5½ inches in diameter and passes through both sides of the crosshead, with taper fits. There is plenty of room allowed by openings in



Side Elevation.



Plan.

THE MCKNIGHT CORLISS MILL ENGINE.

block cast in one piece with the bed, and at the pillow-block end the foundation bolts are 3 inches in diameter, and are placed in the center of the casting, being inclined both ways at 60° with the center line of piston rod, as shown in the side elevation. There are eight other foundation bolts on the crank side of the bed plate, and these are 2½ inches in diameter. All the foundation bolts are placed well within the outer line of the bed plate, leaving this a perfectly plain line all around the engine, avoiding any projections, yet giving large hold on the foundation. The cylinder is connected to the end of the bed with a strongly bracketed flange and 22 bolts 1½ inches in diameter, but is not altogether overhung, as at the

and have 368 inches of bearing surface. The lower guide from its shape always is a trough for oil.

This type of guide and crosshead has not been used to any extent about Pittsburgh hitherto, although quite common in Europe and in the Eastern part of this country, and it has given great satisfaction. The crank is a disk of cast iron bored for a 20-inch shaft, with 14 inch bearing upon it, with two keys, and weighs over 12,000 pounds. The face is about 11½ inches wide. The crank pin is of steel, 9 inches in diameter by 10 inches long, and is forced into the crank with a very slight taper.

The connecting rod is of wrought iron, 15 feet long, and the crank pin end is

the bed plate for easy adjustment of the crosshead gibs and for packing the gland of the piston rod. This gland is in a stuffing box that is removable from the front side of the cylinder. The piston rod is 6 inches in diameter, of steel, keyed into the crosshead and held in the piston by a nut and jam nut. The back head of the cylinder is recessed for this nut and for the heads of the follower bolts, and has six ribs.

The valve openings of the cylinder are 8½ inches in diameter, and the ports are 32 inches long. The stems are 2½ inches in diameter, and the valve stem yokes are cut away on the sides so as to give much more room for packing the stuffing boxes than is usually given. The crab claw is

used in the cut off, thus avoiding the use of so many cranks, but it is reversed, so as to allow steam to enter by the shortest route. In order to avoid the greater angle of valve rod that this arrangement would have made, the wrist plate is raised 9 inches so as to bring the angles of all the rods about of similar degree. The dash pots are set independent of the cylinder, and their rods and the exhaust cranks have pins with bearings at each end, the only overhung pins on the engine being the four in the wrist plate for the valve rods, the eccentric hook pin and the crank pins to which the crab claws are attached. A double wrist plate would have made the setting up of the brasses of the valve rods difficult. The eccentric rod is a 3½ inch pipe, braced, and is quite adjustable. The rock arm has double bearings for both the pins, and the journals at its foot are 9 inches long. The wrist pin is keyed into the wrist plate, and has a bearing with cap, so that wear can be taken up. All the valve motion bearings are much longer than usual in Corliss engines. Every part of the engine has been designed for heavy rolling mill service especially. The fly wheel is 28 feet in diameter, has eight arms and weighs over 42 tons. The arms are elliptical in section, and each is secured between the two cheeks of the hub by three turned bolts fitted in reamed holes. The rim of the wheel is held by elliptical rings of wrought iron shrunk on each side in countersunk recesses and to lugs on the interior face of the rim at the joints. The bearings of the main shaft are 18 inches in diameter by 36 inches long, and the main shaft weighs nearly 18,000 pounds. There is a 16-inch jack shaft driven by the gear on the main shaft to run a train of rolls on the crank side of the engine, while the principal train of the mill is run direct from the main shaft.

The Porter governor is used, and the stand for it has been set on the same independent bed plate that carries the bearings of the rock shaft. The pins in the rock arm are supported at each end, and the bearings working on these pins are of the marine type. The drawings will show the engine and arrangement of gear. The helical gear is of 5-inch pitch and 22-inch face, that upon the main shaft being in two halves bolted together, so as to allow removal in case of need without disturbing the fly wheel or crank disk, or raising the shaft.

The American Telephone and Telegraph Company, operating the long distance telephone, are distributing with their compliments a handsomely bound memorandum book, with a full blank page for every day in the year, entitled "Every Day from May to May." The main office of the company is at 18 Cortlandt street, New York. Offices in other cities are as follows: Boston, 53 Devonshire street; Philadelphia, 134 South Fourth street; Providence, 54 Westminster street; Pittsburgh, Telephone Building; Chicago, 203 Washington street. About 1000 cities and towns containing 80,000 telephone subscribers are now connected by over 100,000 miles of telephone line, affording the means of personal intercommunication to 30,000,000 people.

A very large electric locomotive is now being built at the works of Brown, Boveri & Co., at Baden, Switzerland. This engine will be fitted with dynamos of a total of 1500 horse-power, but which could be increased up to 2000 horse-power. The power will be transmitted to eight electro-motors, arranged on the same number of axles. It is said that this locomotive will attain a higher speed than is usual with steam locomotives; and trials of its capabilities are to be made at the end of the summer.

Colorado Industries.—II.

Editorial Correspondence.

The Lead Question

is one which presents many interesting phases and involves important national issues. The basis of the lead-smelting operations must be lead ore. A certain amount of the base metal must be carried in the charges to act as the gatherer of the precious metals. If the percentage in the charge is too low, the losses of silver and gold in the slag rise unduly, since clean smelting becomes increasingly difficult. Under exceptional circumstances 8 to 10 per cent. of lead in the smelting charge has been worked, but the general practice is not to let it go below 15 per cent. The demand for lead ores since the Leadville mines ceased to supply their great quantities has been urgent at times, and more has been paid for them than could possibly be gotten out. It is from the "dry" ores that the smelters have recouped these losses and have endeavored to make their profits.

The contest between the different smelting centers has been sharp, with the conditions affecting their relative position subject to frequent changes. The ores are smelted either at or near the mines, as at Salt Lake City, Utah or Leadville, Col., or they are carried to points lying at or near the base of the Rocky Mountains, as at Pueblo and Denver, Col., or Helena or Great Falls, Mon., or are transported to the refineries on the Missouri River at Kansas City or Omaha. Finally, smelting centers have been established on or near the Mexican border to treat the Mexican lead ores, as at El Paso, Texas, and Socorro, New Mexico.

The keenest warfare has waged for many years in Colorado between the Leadville works and those at Pueblo and Denver, which have been grouped as the valley smelters. At one time the former seemed destined to extinction, and some of them did actually succumb; but lately the Leadville smelters, two of which are identified with Missouri River refiners, appear to have secured a new lease of life. The Pueblo works have drawn heavily upon the ore resources of the Utah smelters, while the Denver producers have diverted a good deal of ore, under a milling-in-transit arrangement, from the Cœur d'Alene region in Idaho, which should naturally be tributary to the Montana smelters. The Omaha concern has also smelted large quantities of these ores.

The Kansas City company have sought to obtain raw material largely from Mexico, and the St. Louis works, the only refinery controlled by the Lead Trust, own the Rio Grande smelter. Both are credited with being ardent champions of free Mexican ores, which would considerably strengthen the position of smelters at Kansas City and St. Louis, and would to some extent weaken the Denver works. How the question will be affected when the promised heavy shipments of lead ores from over the Canadian border begin it is difficult to estimate at the present time.

The methods followed in

Silver-Lead Smelting.

are broadly uniform with the different works, differing only in details, which, however, materially influence the commercial results obtained. On the whole, it may be stated that very great progress has been made in smelting, both as to technical results and business management, so that today American plants stand unrivaled in magnitude and in practice, considering the difficult conditions prevailing.

The ores as they are received are sampled, the utmost care being exercised.

The samples are crushed and held until settlement is made, while the ore proper is conveyed either to the roasting furnaces, or, if it does not need desulphurizing, is taken direct to the charging beds. All ores which contain an undue amount of sulphur—and the percentage thereof received is steadily growing—are roasted. At first, attempts were made to do this in open heaps, but the irregularity of the work done caused its early abandonment. Then long reverberatory furnaces were adopted, in which the ore is gradually removed by hand from the flue end to the fire bridge, being exposed to a dull red heat. The principal object is the elimination of the sulphur, the sulphides being converted into oxides. At some works the temperature toward the close of the operation is carried to the point of slightly sintering the ore, while at others the final operation is conducted on a special hearth, the roasted ore being carried close to the fusing point. Both methods have their advocates among the metallurgists, those in favor of simple roasting claiming that the losses in the fusing method are too high, while those who urge the latter insist that faster and better blast-furnace work more than compensates for any possible disadvantages.

The roasted ore is conveyed to the mixing beds, where all the ores are spread in layers over a large area, the proportion of the different grades being so gauged that the mixture contains the proper amount of silica, lead and oxide of iron to yield, with the ash of the fuel and any necessary additions of limestone, a slag containing from 30 to 35 per cent. of silica.

The ore mixture is conveyed to the blast furnaces, which are universally rectangular in tuyere section, varying from 30 to 60 inches in width and 80 to 180 inches in length. They vary in height from the center of the tuyeres to the charging floor from 12 to 20 feet, the tendency at all of the works being in the direction of increased height. They all use the syphon tap for the lead, while matte and slag are tapped continuously from the furnace. Blast is supplied by blowers, the general practice being to couple all the blowers to one blast main, from which also all the furnaces are supplied. Some of the managers seem now inclined to the plan of running each furnace with its individual blower, the Root being the type generally adopted.

The fuel used is generally a mixture of coke and charcoal, the latter amounting to about 10 per cent. The products are a base bullion, or argentiferous lead, carrying, according to the mixtures, from 250 to 400 ounces of silver and 1 to 6 ounces of gold. The slag contains 1 to 2 ounces of silver and 0.75 to 1 per cent. of lead. A third product is the matte, a sulphide of iron, copper and lead, containing both silver and gold. The usual practice is to allow both matte and slag to flow from the furnace into an iron slag pot, from which the lighter slag flows over to a second smaller pot mounted on wheels, while the matte, being heavier, accumulates in the first pot. A certain amount of matte escapes this settling action, being entangled in the slag. This settles partly in the second slag pot, while some of it remains entangled in those parts of the slag which are chilled by contact with the pot and in the upper crust. The general practice is to pour out the still liquid slag, either direct upon the dump or into double pot slag trucks manufactured by the Colorado Iron Works of Denver. They swing on a central pin and can thus be easily poured upon the dump. The slag shells are broken up. Whatever matte may be found on the bottom is detached and those portions which are impure are returned to the blast furnace.

The matte is roasted either in kilns or in roasting furnaces and is returned to the

blast furnace until the copper finally concentrates in a matte which can be shipped or treated by works handling argentiferous copper material.

The Grant Smelter.

Two of Denver's smelters belong to the class of silver-lead works. The Grant smelter is the Denver branch of the Omaha and Grant Smelting and Refining Company, who possess the largest lead desilverizing and refining plant at Omaha, where extensive ore-smelting operations are also carried on. The Denver plant consists of ten blast furnaces having a capacity for working from 400 to 450 tons of ore per day, one of the furnaces generally being employed in reworking slags and mattes. The roasting plant consists of 22 fusing reverberatories, with a capacity of 11 tons daily, and nine ordinary roasters, used chiefly for matte and treating $7\frac{1}{2}$ tons daily. The product is about 60 tons of base bullion per day, carrying from 300 to 400 ounces of silver and 3 to 5 ounces of gold per ton. The company have completed the plans for an addition of eight new large blast furnaces, which will make it the largest establishment of its kind in the country. In connection with it the foundations are being made for a stack 350 feet high, 16 feet in the clear, to carry off the fumes of the plant. Connected with it will be a series of underground condensing chambers to catch the flue dust, which is, in the majority of smelters, worked in toward the close of the roasting process. The plant will be equipped with a new blower house, driven by a 500 horse-power tandem compound engine, building in Philadelphia. It is to have 26 and 36 inch cylinders and a 5-foot stroke.

The boiler and roasting coal used in the entire plant is a lignite from the mines of Northern Colorado, costing \$1.75 per ton, delivered, while the furnace coke costs \$8 per ton and charcoal 7 to 8 cents per bushel. Water is partly supplied by an artesian well. A good deal of Denver's water supply is drawn from two horizons 600 and 800 feet below the surface, the artesian well water having the great advantage that it is nearly chemically pure.

An interesting experiment is being tried at the Grant Works in the way of condensation of fumes. The walls of the condensing chambers are being made of the ordinary hollow brick so largely used in building operations. With the aid of a draft chimney, air is made to circulate through the brick, thus cooling to some extent the furnace gases sweeping by them.

The Globe Smelter.

The second of Denver's smelters is the Globe Smelting Company, of which Dennis Sheedy is president, A. Chanute is vice president and Dr. Iles is metallurgist. A more recent plant, it is laid out on a broad, comprehensive scale. It consists of 11 blast furnaces of different sizes, the latest, now being built, being 42 x 140 inches at the tuyeres by 20 feet high, which is to be connected direct with a No. 7 blower. It has 15 calcining furnaces of the ordinary type, but the roasting capacity is to be increased by the addition of two Brown-O'Hara automatic furnaces, which have just been completed, and whose capacity is rated at 30 to 35 tons per day. The furnace, which is 90 feet in length, consists of two hearths about 9 feet wide, heated by auxiliary fire places. The ore is fed at one end, and is conveyed slowly through the whole length of the upper hearth by two sets of plows attached at intervals to an endless chain carried by wheeled trucks. These plows return along the lower hearth, carrying with them, under constant stirring, the ore which has dropped to the lower from the upper

hearth. At the Globe Works the original design has been modified, the roasted ore being finally delivered to a fusing hearth, whose dampers are so arranged that the gases of combustion may either pass through the roaster or may be diverted direct to the stack.

Another feature of the Globe plant is the use of the Lewis Bartlett bag process for the condensation and collection of the fumes and flue dust. We understand that considerable trouble has been experienced in adapting this process to the conditions prevailing with silver-lead smelting. Frequent fires in the bag house, which contains about 2500 bags, have been the principal source of difficulty, which has, however, been partially overcome now, although the source of the conflagrations is not yet thoroughly understood.

The Globe Smelting Company are contemplating the erection of a lead refining and desilverizing plant.

The Boston and Colorado Smelter.

Differing entirely in its methods is the third of Denver's great smelters, that of the Boston and Colorado Company at Argo, a suburb. Ex-Senator Hill and Senator Wolcott are connected with it, the active management, however, resting with Richard Pearce, who has in a long career developed the methods characteristic of the works. The silver-lead smelters employ lead as a carrier of the precious metals, but the Argo works use copper, being practically the only concern of its kind in the country. Until the Butte district of Montana was developed the Argo plant depended largely upon Colorado as the source of both its cupriferous material and its silver and gold ores. Soon after the opening up of the Butte district the interests identified with the Boston and Colorado works secured control of a number of copper-silver mines and built a smelter. Although a separate organization, it is closely affiliated with the Argo works, to which its entire product is shipped. About one-half of the copper annually handled comes from Butte, the quantity being about 2000 tons. The balance of the copper is drawn from Colorado, Utah and other Rocky Mountain States and Territories, and notable quantities come as copper mattes from the silver-lead smelters. Colorado's copper product has become important lately, since the Henrietta and Maid, once a Leadville bonanza mine, has in its lower levels struck a large body of iron pyrites carrying 7 to 8 per cent. of copper and 20 to 30 ounces of silver. The company are always in the market for "dry" silver and gold ores, and can handle to particular advantage the siliceous ores which the silver-lead smelters are inclined to shun. The latter, too, do not pay for the copper contents of ores, so that this class naturally goes to Argo. The company have a capacity for treating about 250 tons of ore per day, and produce annually about 4000 tons of copper, over 5,000,000 ounces of silver and a large quantity of gold. The stock of metals in ores, furnace materials and intermediate products amounts to 2000 tons of copper, 1,200,000 ounces of silver and about 23,000 ounces of gold.

The ore is sampled in the usual way, and that part of it which needs desulphurizing is roasted in a large number of calciners, which handle from 7 to 8 tons per day. Lately, Mr. Pearce has put up two Brown-O'Hara continuous roasting furnaces, modifying the second one in some of its details. The general features are the same as those described as forming a part of the plant of the Globe Smelting Company.

The roasted ore and siliceous ores which did not need calcining are smelted in reverberatory furnaces to a matte, charge after charge being thus worked until the matte accumulates in the hearth, filling it, the slag being tapped with every charge.

The matte produced is broken, crushed and finally ground in a Chili mill. It is again roasted in long reverberatory furnaces down to a sulphur contents of 7 to 8 per cent. This is followed by a final roasting, so conducted that the silver in the matte is converted into a soluble sulphate, while the greater part of the copper is an oxide. The silver is extracted by leaching with water by the method known as the Zier-vogel process. The solution of sulphate of silver is conducted into vats filled with cast copper plates, the silver being precipitated by the copper, which goes into solution. In its turn the copper is precipitated in a second series of vats by scrap iron. The silver precipitated is boiled in a vat containing dilute sulphuric acid heated with steam conducted into it mixed with air. The last traces of copper in the silver precipitate are extracted. It is dried, melted and cast into bars, 999 fine, the silver being principally shipped to the New Orleans mint. The precipitated copper is cast into bars, which are used over again for the precipitation of silver.

The leached roasted material, from which the silver has been extracted contains copper and the gold. It is smelted for a blister copper, from which the gold is extracted by a method the details of which are not disclosed. The copper, finally deprived of its silver and gold contents, is either sold as such or as an oxide. In the latter form a considerable market has been found with the Standard Oil Company, who use it in connection with the refining of Lima oil.

Pueblo Smelters.

The most formidable rival of Denver as a smelting center is Pueblo, 120 miles south. It has the natural advantage that it lies nearer the principal producing camps of Colorado, and is closer to the southern coal and coke districts. The railroads, however, have generally treated the two centers as common points, and on that account the full natural advantages of its location have not been secured. Still, it possesses three large silver-lead smelters in active operation, and claims the distinction of having the only iron and steel making plant on the eastern slope of the Rocky Mountains. The Colorado Coal and Iron Company have struggled long for a footing in the markets against great difficulties, among which are a coke high in ash and iron ores relatively lean and highly siliceous and high in sulphur. The plant includes three blast furnaces, one of which has been recently built, but has not yet been blown in. The pig iron made is reputed to be exceptionally high in silicon, which involves very long and very hot blows in the Bessemer works. The rail mill has been considerably remodeled, notably in the finishing department, and two pit heating furnaces have been put in. Still, the mill is without modern tables and its capacity is small, recent records being about 180 to 190 tons in 14 hours. We understand that there are now on the books orders for about 17,500 tons, which will keep the plant running for some time to come. A Davis-Colby roasting furnace, heated with oil cheaply obtained from the adjacent Florence oil field, has been put up recently to reduce the sulphur in some of the ores which are the main reliance of the plant.

The oldest of the Pueblo silver-lead smelters is the Pueblo Smelting and Refining Company, at one time largely controlled by Boston capital. Now, however, the chief ownership of the stock is vested with Colorado people. It is now undergoing considerable remodeling, the works in many respects having failed to keep up with recent improvements in practice. The works have 17 blast furnaces, of which, however, only five are of modern design and capacity. The company contemplate

the construction at an early date of a number of new furnaces. Three out of the nine roasting furnaces have been removed and work is begun in the building of two large Brown-O'Hara roasting furnaces. The Pueblo Smelting and Refining Company are thus far the only ones of the valley smelters which have their lead-desilverizing plant. It consists of two reverberatory softening furnaces, in which the base bullion—the product of the blast furnaces—is deprived of any arsenic, antimony or copper it may contain. From the softening furnaces the lead is tapped direct into two sets of two 20-ton desilverizing kettles, in which zinc is added in two portions, the zinc desilverizing process being employed. The zinc forms with the silver and some of the lead an alloy less fusible and lighter than lead. After the metal has been thoroughly mixed with the zinc it is allowed to stand and cool. The rich zinc-silver-lead rises to the surface and is skimmed off. The lead remaining contains only about 0.1 ounce of silver, but has alloyed with it some zinc. It is syphoned from the desilverizing kettle to kettles placed on a lower level, where steam is passed through it. The zinc is oxidized, appearing on the surface as a yellow powder. The lead thus refined is cast into molds, and is either marketed as such or is made into lead pipe, the Pueblo Smelting and Refining Company having a pipe plant.

The rich zinc silver-lead alloy is distilled in plumbago retorts, the zinc being recovered in metallic form, while the silver and lead form a rich alloy. The latter is first cupelled in one set of cupelling furnaces until it is about 500 fine, the lead being converted into litharge by oxidation and being tapped off. The very rich metal is cupelled in a second smaller furnace producing nearly fine dore bars. The gold has accompanied the silver throughout the whole process, and the alloy of gold and silver, technically known as dore bars, is shipped to market, the works having no parting plant.

For years the Pueblo Smelting and Refining Company have experimented with the desilverization of copper material, and have finally adopted the Crook process, which has been materially modified and cheapened, and promises now to become a working part of the plant. On a series of terraces are four reverberatory smelting furnaces from which lead may be tapped from the higher to the lower. Each is capable of holding from 20 to 25 tons of lead. That quantity is first melted in the furnace placed on the highest terrace. From it it is tapped into the second, third and fourth in rotation. Crushed argentiferous copper matte is charged through a hopper into the third furnace, and, under a reducing flame, is rabbled in for one and a half to three hours, the lead absorbing a part of the silver in the matte. The latter is withdrawn from the furnace, and is again crushed, while the enriched lead, carrying about 100 ounces, is tapped into the fourth furnace, from which it is cast into molds to go to the desilverizing plant. The partly desilverized matte is again crushed and is then charged into the second furnace, where it meets poor lead. Stirring it in, the matte is sufficiently desilverized to be subjected to further treatment. The lead thus partly enriched is tapped into No. 3 furnace, where, as already described, it is used for the desilverization of the original matte. Practically, therefore, the copper matte desilverizing process is carried on in two furnaces, the first acting merely as a melting and storage furnace for poor lead, and the fourth for a storage furnace for rich lead, so that the method has been considerably simplified as compared with the original plan, in which all four furnaces were intended for use as desilverizers.

The desilverized matte is roasted for the elimination of the bulk of the sulphur in

two long reverberatories. Then it is subjected to what is called "moss" roasting in two small reverberatories, the principal object being to convert the lead present into a sulphate of lead which is more readily slagged in the subsequent smelting for blister copper, an operation carried on in the usual way in two reverberatories. The blister is finally refined in a copper refining furnace and cast into ingots, its marketable form. We are informed that it contains from 7 to 10 ounces of silver. The quantity of matte which can be treated in the new plant of the Pueblo Smelting and Refining Company is 25 to 30 tons per day.

The Colorado Smelter.

The second of Pueblo's smelters is that of the Colorado Smelting Company of which A. Dwight is metallurgist. For years these works occupied an exceptional position through the possession of the Monarch Mine, which furnished ample supplies of an ore high in lead, though poor in silver. During the prosperous days of this mine the company did not find it necessary to engage in the keen struggle for plumbiferous ores, but now that the Monarch is not furnishing more than small quantities of ore, this advantage no longer exists. The plant contains six blast furnaces, to which two more are to be added. The height of all the furnaces will also be increased in the near future. It has five reverberatory roasting furnaces, a sixth, about 14 feet longer, being under course of construction. The practice at the works is to carry the roasting merely to the sintering point. All the first mattes made are calcined in kilns, the practice differing in this respect from that of the other works. It may be worthy of note also that the foundations for the new furnaces are made by filling pits of adequate size with molten slag, thus securing practically monolithic blocks for the foundations. An ingenious method of sampling the base bullion is also practiced at these works. At the time of the visit of the representative of *The Iron Age* only two furnaces were in operation.

Pueblo's third and youngest successful smelter is that of the Philadelphia Smelting Company, a well designed plant, having eight furnaces differing in size. It is equipped with 12 roasting furnaces.

Pueblo itself is a bustling city of about 35,000 inhabitants, which has in late years enjoyed a real estate boom which has brought a good deal of money into the coffers of the Colorado Coal and Iron Company. In some respects the town is very advantageously located. C. K.

According to the census of 1890, there are 15,000,000 people living in the States and Territories lying west of the Mississippi River, almost one-fourth of the entire population of the United States.

How to calculate the speed of a locomotive by counting the revolutions of the driving wheel is done by ear and by feeling. To any but a trained ear the sound from the smoke stack of a locomotive traveling faster than 60 miles an hour, the *New York Sun* says in an interview with Angus Sinclair, is like a continuous blast, but an old engineer can detect distinct pulsations. It is an acquired faculty, and comes only with long experience. There are four puffs to every revolution of the drivers, and one of these is a trifle louder than the others. This serves to divide them into fours. A trained engineer can count these puffs, and, by grouping them into twenties, which he checks off on his fingers, arrive at a conclusion regarding the number of revolutions per minute. Then, the circumference of the drivers being known, it is a simple matter to reckon the rate of speed.

Treasury Decisions.

DUTY ON FORGED SHOTGUN BARRELS.

The following decision was rendered by the Board of U. S. General Appraisers at New York on April 19, in the matter of the protest of H. Keidel & Co. against the decision of the Collector of Customs at Baltimore, Md., as to the rate and amount of duties chargeable on certain so-called "forged shotgun barrels, rough bored," imported per Veendam, August 22, 1891.

We find, from an examination of the sample, papers, and testimony in this case, and from common knowledge:

1. That the goods in question were invoiced as "Boston Damascus barrels," and consist of forged shotgun barrels in pairs, bored to proper gauge, but requiring to be further bored or smoothed to exact size or caliber before being fit for use as parts of completed guns.

2. That these barrels, after coming from the forge, have been firmly and completely welded and brazed together, with the ribs perfectly braced on and have been ground, smoothed, and finished on the outside so near to completion as to require only some additional polishing to render them fit for use as parts of guns.

They were assessed for duty at 45 per cent. ad valorem, under paragraph 215 of the act of October 1, 1890, and are claimed by the protestants to be free of duty under paragraph 702 of said act, which provides for "shotgun barrels, forged, rough bored."

The appraiser states in his special report to the Collector that "an examination of the merchandise made by experts showed that they were forged barrels, bored, ground and welded together, tried and proven by a certain gauge, and bore upon them the foreign government stamp, which, after being affixed, admits of no more manufacture to alter the gauge; the only additional work necessary to complete the barrels was to have the screw at the breech cut out so that cartridges might be inserted, and have the barrels polished." An expert witness examined by the board, who has been superintendent of a large gun works for 18 years, testified, in effect, that, while the interior of the sample in the case was what he would consider rough bored, the article was not in fact a barrel rough bored, but nearly approached a gun in the finished state. The barrels, he said, had been "struck" or finished on outside and brazed together, with two ribs welded or braced on, whereas barrels in the rough are single, are not brazed together, and bear a rough circular grindstone finish, unlike that of the sample, the outside of which approached near the finished condition.

Congress having (in paragraph 170 of the new tariff act) imposed high protective rates of duty on all sporting breech-loading shotguns, whether single or double barreled, it is unreasonable and illogical to assume that it is intended to exempt from duty the more important parts of the same articles, when approaching at all nearly the finished condition.

We are of the opinion that paragraph 702 of the act was intended to exempt from duty such forged shotgun barrels as are bored in such manner only as is necessary to determine whether the article is sound and perfect, and which are otherwise in the rough condition in which they come from the forge, without being perfectly welded and brazed, polished, or otherwise advanced toward completion.

In accordance with the views above expressed, and with our findings of fact, we hold that the goods in question were properly assessed for duty by the Collector, and his action is sustained.

Japan is importing cotton-spinning machinery for the equipment of numerous large factories.

Opposed to Free Ships.

A vigorous protest against a bill introduced in Congress for the admission of foreign-built ships to American registry has been unanimously adopted by the Board of Trade of Cleveland, Ohio, who are apprehensive that harm may come to a now prosperous industry at the lake ports. It concludes as follows:

"The sailing as well as the building of the ship has vindicated the American policy of defending our coasting and inland trade. The cost of transportation by American-built ships has been steadily reduced, until the movement of our primary products on the lakes has been done at rates unapproachable by railroads. The 9,041,213 tons of freight which passed through the St. Mary's Canal in 1890 was moved an average distance of 800 miles, at 1.3 miles per ton per mile. The Interstate Commerce Commission reports the average of rail transportation in the United States to be in 1889 9.22 mills per ton per mile.

"American shipbuilding, under our existing laws, has not only fully met the wants of our coasting and inland commerce, but it is now advancing at a rate that will cover all future necessities. In 1886 there were on these lakes 21 steamers having each a registered tonnage of over 1500. In 1891 there were 126 of that capacity. In 1886 there were on the lakes only six steel steamers, registering 6,459 tons. In December, 1891, there were 89 steel steamships, registering 127,624 tons, valued at \$14,500,000. To this fleet of large steel steamships 32 more of equal capacity are to be added, which are now leaving the ways of our shipyards. These great facts, which we beg leave to present to your honorable bodies, indicate conditions of American shipbuilding that ought not to be disturbed. The legislation just now perfected, which gives American registry to two 10,000-ton ships already mainly owned by American capital, conditioned on the construction, in our own shipyards, of two other ships of the same capacity, to be at the service of the Government as cruisers in time of war, is exactly in line with the principle and policy for which we contest.

"A wise national policy, entered upon at the beginning of our national life, and looking to independence on the sea as well as on the land, should not now be reversed. That policy, in the interest of American commerce, prescribed the limitation of American registry to the American ships. To remove that limitation now, when American shipbuilding, under the American range of wages, and in the absence of the subsidies which secure so much of the carrying trade of the ocean to the British marine, is giving to the American people the cheapest transportation in all the world, would not only strike a blow to vast home industries, but it would be a discrimination in favor of foreign interests that would be unattended by any collateral or incidental advantage to our own people."

The protest is directed against what is known as the Fithian bill, a radical scheme which would not only admit indiscriminately foreign built steamers of every description to American registry, but open our coastwise trade as well to the competition of cheap foreign "tramps," or any others who may see fit to avail themselves of a coastwise license, conferring upon them equal advantages with American citizens.

Judge Harding of Wilkesbarre, Pa., referring to the Reading deal, says that the several lines of railway involved are practically parallel, as defined by the constitution of the State, and that "parallel" and "competing" mean the same thing.

The American Society of Mechanical Engineers.

SAN FRANCISCO MEETING.

After an uneventful but very enjoyable journey across the continent, 40 members and the same number of ladies arrived in San Francisco last Monday to attend the first meeting of the American Society of Mechanical Engineers ever held on the Pacific Coast. The visitors were most cordially welcomed by the Mayor of the city in a very graceful speech. In the afternoon they inspected the cable railroad plants under the guidance of W. R. Eckart, chairman of the California Committee.

The first session was held in the evening, Robert W. Hunt, president of the Society last year, being in the chair. A hearty greeting was extended by the president of the Academy of Sciences and by John Richards, president of the Technical Society of the Pacific Coast.

John Richards of San Francisco contributed some

Notes on a Problem in Water Power,

stating, in preface, that his paper belonged to the non-scientific class, and was presented with a view to calling out discussion on a most important subject. Water wheels, as we have to deal with them, may be classed as gravity wheels, including overshot breast wheels, and perhaps the Poncelet types; pressure wheels, including what we call inclosed turbines and reaction wheels; and impulse wheels driven by spouting water. In modern practice the class called pressure turbine wheels constitutes perhaps four-fifths of the whole. These can be divided into three general types—namely, the Fournayron, or outward radial discharge; the Jonval, or downward discharge parallel to the axis of rotation; and the American, or inward flow, wheels. These have come into general use all over the world. They are by common consent regarded as the most efficient and, indeed, until recently, have been the only wheels which were considered in connection with an efficiency beyond 60 per cent. The author then dwelt upon the operation of the turbine wheels and the defects, due, mainly, to the arrangement necessary. Continuing, Mr. Richards said:

Turning now to the other type of wheels, but little known in this country except on the Pacific Coast, the impulse class, and assuming that the force of spouting water is equal to its gravity less an inconsiderable friction in orifices, the question arises, Why has not the evolution of water wheels followed on this line instead of pressure for all except low heads?

This is a very important question, one that may well engage the attention of this society, and one that calls for explanation such as will be by no means easy or apparent. It is true that with that class of impulse wheels called "undershot," and some other cruder forms operating by the impulse of spouting water, the efficiency attained has been so low as to lead to the conclusion that the losses were inherent in the method, or mode of operation, and this opinion has, it seems, become general without any one very closely inquiring into the matter.

That the efficiency of tangential wheels driven by impulse is as high as can be attained by pressure turbines has been proved by numerous experiments here, also by some recent tests at Holyoke, Mass., and

is beyond controversy. It has long been settled on this coast, and as a problem no longer exists. No one here would expect under a head of 50 feet or more to attain with any known type of pressure water wheels a higher efficiency than is given out by tangential impulse wheels; but this state of opinion and practice is confined to narrow limits now, and is more to be wondered at when we consider the rapidity and completeness of investigation in other branches of dynamic engineering at the present day, especially when the economic and constructive conditions so much in favor of the impulse type of water wheels are taken into account.

There is a wide difference between a water wheel driven by impulse and one operating on the pressure system. The first cost of the former for a given power is one-half as much, and its maintenance is still less, in proportion.

The author suggested that it would be well for the members to see some of the impulse wheels in operation under various heads, especially under high heads.

"In observing a machine of any kind in motion, there are impressions gained which cannot be conveyed by description, but I warn every one against inference from this remark that the tangential water motor wheels on this coast are not scientifically understood and treated. The problems involved may not be so many or so intricate as in the case of pressure turbine wheels, and this is fortunate, because the literature of the latter is one of much perplexity to any but skilled mathematicians, and for that reason has not been of so much use as it ought to have been in developing the wheels."

There was no discussion on this paper.

The paper by John H. Cooper of Philadelphia described

A Self-Lubricating Fiber Graphite for Bearing

which is the invention of P. H. Holmes, of Gardiner, Maine. This bearing material is composed of natural graphite, which has been finely divided and freed from all foreign matter, to which is added wood fiber mixed in water in various proportions according to the purpose to be served, and then solidified by pressure in molds. The bearings are then thoroughly dried, then saturated with a drying oil, and finally subjected to a current of hot, dry air, for the purpose of oxidizing the oil and hardening the mass. When finished they may be machined to size the same as metal. It is stated that this material has been used with great success.

This paper was discussed at some length by G. W. Dickie and James Spiers.

Machine Molding

formed the topic discussed in a paper by Harris Tabor of Elizabeth, N. J. Since the origin of metal founding the molder has been pleased to shroud his methods in certain mysteries which, to him at least, seem essential to perfect castings. It may be said of this trade more than any other that the traditions of generations cling to it. He can tell why his casting is good, but can rarely give a reason when it is bad. In all other industrial branches the senses of touch and sight are always at the command of judgment. In the machine shop contact between workman and his work is always possible; an error may be detected as soon as made and corrected at once; there are no final chances upon which the success of the machinist's job depends. With the molder it is different. The conditions which insure bad work and cannot be anticipated are numerous. There may have been a bar in the "cope" under enough tension to induce a "drop" when the additional "strain" of clamping was put on; the core, with which he had nothing to do beyond setting, may have been

made with no reference to free "venting," and a "blow" follows pouring. His troubles do not end here; the melter may have been in a careless mood to the extent of dull iron, and a casting with "cold-shuts" is his reward; if his foreman make a wrong estimate on the amount of iron necessary to "pour" his mold and give him too little, another loss will be charged to his account. His strongest influence upon the quality of his work lies in skill which cannot be verified by caliper, gauge or rule.

The molder's art is in making the mold of the proper density. Drawing a pattern from the sand after it has been rammed, and mending a broken mold, are mechanical operations easily taught. It is not so with ramming. If a touch of genius enter into molding, it is shown in making the mold of such density that it will stand pouring without "straining" and be soft enough to prevent "blowing" and "scabbing," with a certainty that the sand will remain in place until the iron has solidified. This is the molder's skill, which cannot be formulated and passed down to succeeding generations in books. It seems to be governed by an unwritten law which declares to him who would teach by theory, "Thou art not 'in it.'" Ramming a mold from the top to produce a required density on the under side may seem a simple operation to the layman, but a trial will convince him of one difficulty in molding. After he has learned to ram a flask with a given depth of sand, should he try one half as deep, he will discover his previous experience has not made him an all-around molder. This point is well illustrated in many large foundries doing duplicate work, where unskilled labor has been taught to mold a single pattern. In such cases, it is an invariable rule that it is not safe to change a man's work without putting him through a system of training on the new pattern. The writer has been told by foremen in such foundries that men who did excellent work on patterns which they had been taught to mold were worthless on any other. In these cases the difficulty is in ramming and pouring, principally in ramming.

There can be no gauge to determine the force of the rammer's blow. It is a question of experience supplemented by good judgment. Some men have a capacity for acquiring this skill beyond others, and they are slow to impart it. On this account we see a greater relative difference in the skill of molders than in any other trade, and it is for this reason that there are so few molders coming to take the place of the old school which is disappearing.

The development of machine molding has been gradual, covering a long period. The follow board, which covers, or shuts off from the sand, that portion of the pattern above the joint line, was probably the first change from the original method of molding in boxes. The match plate, which is a plate fitted with pins and pin holes for the flask, with a portion of the pattern fitted thereon like a medallion, came next. This was a greater improvement, for it compelled the flasks to be interchangeable.

Silhouette, or stripping, plates followed, with decided advantage. The stripping plate, often called drop plate, is a plate cut out to receive the outline of the pattern at the joint line; enough is added to the pattern to project through the plate to the pattern base. Like the match plate it is fitted with pins and holes to receive the flask; it is also a molding table, or board on which the flasks are rammed. Originally this plate was turned with the flask, and the pattern drawn through the plate by hand. Modifications of the stripping plate are numerous, nearly all embodying a frame or table, with lever attachment for drawing the pattern without turning the flask. A good illustration of

this type is the machine for molding pulleys.

The evolution of the power machine from the hand machine was natural. The deep-rooted prejudice on the part of the workman has had its effect on the development of so great an innovation in foundry methods, and its progress has been slow. There are, however, a number of excellent power machines on the market, operated respectively by belts and cams, hydraulic, pneumatic and steam pressure.

All ramming machines may be said to have platens, of which there are two types, rigid and flexible. The rigid platen is simply a block of sufficient size to cover the surface of sand in the flask; the flexible platen is one which yields to irregular depths of sand, and exerts a like pressure on all parts of the mold. Of the flexible platen there are two: the water bag, which is a rectangular box with a rubber diaphragm for the bottom, filled with water; a group of rammers, equal in size to the flask to be rammed, hung on equalizing levers so that each rammer is independent of its fellows. At first thought, the flexible platen would seem to be perfect. If sand, under pressure, flowed like water, and its required density over the pattern was the same as needed on the joints of the mold, nothing could be better. But these conditions do not exist. The friction of sand upon itself and upon the walls of the flask makes it comparatively unresponsive when rammed by equal pressures; if we add the fact that the mold, to pour well, should be softer over the iron than at the joints, we see that uniform pressure on a mold falls short of the requirements; it is better, however, than the rigid platen, and requires much less hand work in the way of ramming and tucking. As an evidence of the difficulty in making equal pressures suit all conditions, a case can be cited where we had a pattern projecting vertically about 6 inches in the sand; at this point the side of the flask, which was 8 inches deep, came within 2 inches of the pattern. The average pressure per square inch over the mold was 40 pounds, the pressure put over the narrow belt of sand between the flask and pattern was 70 pounds per square inch, leaving only 28 pounds per square inch over the higher portion of pattern; yet notwithstanding the deep sand had two and one-half times the pressure exerted over the lesser depths of the mold, it was necessary to precede the work of the machine rammers at this point by hand tucking. This was an unusual case. It is true in all cases that more pressure is needed along the walls of the flask to overcome the friction of the sand; hence we have found it necessary to arrange our rammers to produce this result, giving the marginal rammers about 50 per cent. more pressure. This does not always give perfect ramming, and occasionally it is necessary to do some hand work, but as a rule, this arrangement of rammers gives good results without hand manipulation.

The writer then gives a description of a steam-actuated machine designed by him from working drawings. The piston takes steam on the under side only, its weight being sufficient to return it promptly after the mold is rammed.

To the piston rod is attached the principal part of the mechanism, consisting of a table with lugs projecting upward, and supporting the pattern frame upon which rest the patterns; the stripping-plate frame directly over the pattern frame, and resting on it, to which the stripping plate is attached; the stool plate suspended to the stripping-plate frame, and moves with it; side levers and tumbling shaft for tripping after the pattern is drawn. The pattern frame has an annular passage which is connected to the cylinder by a small pipe, the object of this being to admit some steam to the pattern plate at each movement of the piston, this steam serving to keep the

patterns moderately warm, preventing "sweating," or accumulation of moisture from the atmosphere, and making them draw from the sand more freely and smoothly. The stripping-plate frame is guided by two bored sockets, one at the front and the other at the back of the machine, there being air holes below the pistons, by which any desired amount of cushion can be obtained for the drop of the stripping-plate frame. The stool plate is really part of the stripping-plate frame placed below the pattern frame, and its object is to support stools or internal parts of the stripping plate used in holding green sand cores, or heavy bodies of hanging sand, while the pattern is being drawn. The side levers are pivoted at one end to the table, and are connected at the middle by links to the stripping-plate frame, the outer end being free. The tumbling or tripping shaft is in front of the machine, near the floor, and has arms projecting upward along the line of travel followed by the free ends of the side levers; on these arms are stops which engage with the free ends of the levers on the downward motion, to draw the pattern.

The ramming head is carried by wrought rods at either side of the machine, these being attached to a horizontal shaft at the bottom of the cylinder, which allows them to be swung forward and back, a spiral spring being used to counterbalance the weight. The ramming head is usually of wood, roughly cut out over the pattern, to avoid too hard ramming on the high places. This block may, of course, be readily changed to suit any flask within the capacity of the machine. The stops on the stripping plate can be also changed to suit any pattern within the range of the machine. The steam pipe enters the cylinder at the bottom, and from the throttle valve to the cylinder serves also as an exhaust pipe, the throttle valve being a two-way cock, by which steam is either admitted or exhausted from the cylinder.

The operation of the machine is very simple. The half flask is put on the stripping plate, with the sand box to hold the sand which is to be compressed, and both are filled with sand. The ramming head is then swung forward over the flask against stops, which define its position, and the throttle valve opened. The upward motion of the piston and attached parts carries the flask and sand up to the ramming head, where it is rammed instantly, and upon the throttle-valve lever being moved again, steam is cut off, and at the same time exhausted, allowing the flask to descend, the stops then engaging the free ends of side levers, and arresting the downward motion of the stripping plate at a point about midway. The pattern continuing to descend is drawn from the mold, and when the piston has returned to its lowest position the sand is struck off the flask, which is then taken from the machine. As the man removes it he presses the tripping treadle with his foot to release the stripping-plate frame, which then falls to its proper position with respect to the pattern, and the machine is then ready for another mold.

DISCUSSION.

M. P. Higgins described the venting cores used at the Dean Pump Works at Holyoke, Mass. Waxed twine is introduced, and after it has been carefully dried it is withdrawn, leaving vents.

D. G. Moore of S. L. Moore & Sons Company of Elizabeth, N. J., where the Tabor machine has been used with great success for some time, said that with molding machines there was greater regularity and increased uniformity in the weight of the castings.

A Novel Fly Wheel.

Charles H. Manning of Manchester, N. H., described "A Novel Fly Wheel." As this wheel was illustrated and described in *The Iron Age* of April 14, 1892, it is not necessary to present Mr. Manning's paper.

A. K. Mansfield, T. J. Borden and G. W. Dickie took part in the discussion of this paper. The general impression was that the first fly wheel—the one that collapsed, was faulty in design.

W. Wallace Christie of New York City gave an account of

An Experiment with Aluminum.

About two years ago the writer was detailed by F. W. Snow, superintendent of the Ramapo Iron Works, to make a series of mixtures for cast metal and to test the castings, and this paper is prepared with the hope that it will be worth preservation with the numerous tests of aluminum compounds already recorded.

Mixture No. 1:

	Pounds.
Wrought-iron turnings.....	10
Cast-iron turnings.....	10
Steel-rail chips.....	15
Ferro-silicate of iron and aluminum.....	2

Test No. 2:

Wrought-iron turnings.....	10
Cast-iron turnings.....	5
Steel-rail chips.....	15
Ferro-silicate of iron and aluminum.....	2

The melting was done by a well-known brass founding firm in their brass furnace. In order to melt the mixture very high temperature was required on account of the wrought iron, which requires 3000°; so the crucible was covered with a carbon lid and the coal heaped upon it. Even then about three hours' time was required to melt it, and after being melted the ferro-silicate of iron and aluminum, which had been left out, was added and thoroughly stirred through. The castings were made 1½ inches diameter by 14 inches long, and in green sand without any charcoal facing, and after the skin of sand had been removed from the castings they were very smooth and clean.

Mixture No. 1 was very fluid when hot and white, but had to be poured quickly, as it soon cooled.

Mixture No. 2 was not as fluid or as white as No. 1.

Mixture No. 1 made a very homogeneous casting; No. 2 not nearly so much so, and its fracture duller than No. 1, which latter was very bright.

It may also be said that pieces of both mixtures which have been on my desk since April, 1890, when they were cast, have retained their original brightness, which speaks well for the small percentage of aluminum in them.

Mixture No. 1 could not be touched by a specially tempered cold chisel but its edge was entirely destroyed. A piece of mixture No. 2 shows where a tool maker had used an hour's time cutting off but little, and during that time the tool required many sharpenings; I believe five or six. When heated to a high red heat they both crumble when struck with a hammer, but when heated to a dull red heat No. 1 was placed under a steam hammer, and though quite resisting allowed itself to be flattened to about 1½ inches thick before crumbling, but gave better results when annealed over one night.

No. 2, when heated in the forge to a dull red heat, could be flattened to about ¾ inch thick.

Having in his possession a piece of No. 1 when doing some laboratory work at Cornell University the writer had it remelted and cast into the usual shape for tension tests. This piece, though but 8½ inches long, was put in a Fairbanks testing machine, but as it was uncertain as to just how it would act no extensometer was used for fear of the test piece breaking

suddenly. Breaking occurred at a scale reading of 13,860 pounds. The piece broke, however, in the jaws of the machine and in the larger section of the piece, as there was a flaw in it (cinder flaw). For fear of breaking the jaws of the machine the test ended here. After breaking the smaller section in the impact machine the area was obtained by a planimeter as 0.31 square inch, which makes the tensile strength per square inch at the time of breaking 44,710 pounds. This would have been higher, and probably considerably, but for the flaw and untrue grip of the jaws, which caused a combined transverse and torsional strain. The area of smaller section was less than that of the sound portion of larger section, hence its use. When placed on a Heisler impact machine, between supports 6 inches apart, a weight of 25 pounds falling 1½ inches was required to break a circular section of 0.31 square inch. Two uses for this metal have suggested themselves to me: one for floor plates in a boiler or engine room where great strength is not required, but where wear is; also as bearings for pivots. Of course, it is not desirable to use it for work requiring finishing, as it is too hard for that, except when done on a grindstone.

The ferro-silicate of iron and aluminum used was an ordinary commercial article, purchased in the open market, and whose composition the writer was unable to learn.

No. 1 is much harder to grind than No. 2, and both present very smooth surfaces.

Wm. S. Aldrich of Baltimore, Md., presented a paper

On Compounding Centrifugal and Load Governing by a Rotary-Piston Valve.

After enumerating the most essential features of the problem of governing steam engines for uniform speed, in view, especially, of marine engines in central stations, the writer dwells upon the advantages possessed by a compound automatic cut-off valve mechanism, operated by centrifugal and load governing forces. In the case of a single valve for a single-cylinder engine, the two governing forces may be introduced by making the valve of the piston type and giving it a variable movement of reciprocation with a variable movement of rotation or of oscillation, the movements being independent of each other. The valve friction will be reduced to a minimum by combining reciprocation with rotation. The centrifugal governing forces control the variable reciprocation; the load governing forces the variable rotary movement, or *vice versa*. An electromagnetic mechanism under control of the turning moment of the dynamo, or of its external electrical circuit, introduces the load, or dynamometric principle. This electro-magnetic control of the point of cut off not only possesses great facility of application, but differs from all other applications of the dynamometric principle in not requiring intermediate transmissive mechanism, with gear wheel or pulley trains, nor weights, springs or belt-tension devices of ordinary transmission dynamometers. It also acts instantaneously upon any change of load on the dynamo circuit; and it is not possible to anticipate further any load changes, because the slightest change of load is instantly felt at the valve, through the electro magnetic mechanism controlling one of movements.

An analysis of some of the combinations more or less desirable, as to the steam supply, gives to the reciprocating movement main control, and to the rotary movement the auxiliary or independent cut off, or *vice versa*. Both rotary and reciprocating movements may be operated independently or in conjunction with each

other. In a single rotary-piston valve all the points of the steam stroke are under control. Arranged for the Corliss type, the rotary-piston valves would be used at each end of the cylinder to control the admission and cut off, while release and compression are fixed for the best normal working conditions. In multiple expansion engines, each cylinder is fitted with a rotary-piston valve; though, in some cases, load governing forces may alone be used to control the steam supply for the low-pressure cylinder.

The rotary-piston valve, with its variable compound helical motion, possesses all the advantages of a slide valve and a piston valve, and the inherent disadvantages of neither.

The advantages of governing central station and other engines in the electrical service, by compounding the centrifugal and the load governing forces by a rotary-piston valve, may be thus summed up:

Best combination of conditions for uniform speed under no load or extreme variations of load and steam pressure constant or slightly variable.

Steam supply as directly and instantaneously proportioned to the external load as it is possible to make it by electromagnetically controlling the point of cut off.

Valve friction reduced to a minimum.

Load governing forces capable of the most sensitive and delicate adjustment by electrical means.

Independent governing against variations in the external load, compared with variations of driving effort and of the internal load of the engine.

Each governing principle regulates that which the other cannot, and without interference.

Rotary-piston valve, with helical ports, gives quick and sharp cut off, with increased port area.

Failure of either governing device permits of the engine running temporarily under control of the other.

Dynamometric governing of a multiple-expansion engine driving several dynamos, any one of which may be thrown on or off at any time.

Profs. J. E. Denton and D. S. Jacobus of Hoboken, N. J., presented a

Summary of Results of Principal Experimental Measurements of Performance of Refrigerating Machines.

The paper deals with tests of air machines, ammonia machines of both the absorption and compression type, sulphur dioxide or Pictet machines and carbonic acid machines. The refrigerating effect of the first is equivalent to 3.4 pounds of "ice melting effect" per pound of coal required to drive the steam engine, or 43.1 per cent of the theoretical result. In the second, the "ice-melting effect" per pound of coal is 20.1 pounds, which is 52.2 per cent. of the theoretical effect. In the third or compression type of ammonia machine, the "ice-melting effect" varies from 46.29 to 16.14, according as the suction pressure varies from 45 to 8 pounds above the atmosphere, this pressure being the condition which mainly controls the economy of compression machines. These results are equivalent to realizing from 72 to 50 per cent. of the theoretically perfect performance.

The Pictet machines are practically as economical as the ammonia. The carbonic acid machines have an efficiency considerably less than the ammonia, and as they require pressure reaching 800 pounds per square inch, there seems to be no reasonable ground for their use.

The Steam Distribution in a Form of Single-Acting Compound Engine

was discussed by F. M. Rites of Pittsburgh, Pa. The paper considers the single-acting engine as an economic study only,

the steam distribution being entirely independent of single-action or other mechanical features, and serves to satisfy a very natural curiosity regarding the remarkably uniform efficiency under extreme variations of conditions.

The Electric Railway as Applied to Steam Roads

formed the subject of an interesting paper by B. J. Dashiell, Jr., of Philadelphia. The first part of the paper deals with train resistances, the discussion being finally arranged in tabulated form. The first table gives the atmospheric pressures from 0.1 to 5 square feet of exposed area of traveling train at speeds up to 120 miles per hour. The pressure upon 1 square foot is given as follows:

Miles per hour.	Pounds.
1.....	0.15
10.....	1.5
20.....	3.0
30.....	4.5
50.....	7.5
100.....	15.0
120.....	18.0

from the rear axle to the forward one by means of the side parallel rods. It will be well to state here that it is planned that all future freight locomotives should have the single-reduction type of motors. The motor consists of wrought-iron field magnets which are bolted to a magnetic yoke of mitis iron. One of these yokes carries the bearings which support that end of the motor on the axle, while the other yoke is spring supported from the other axle. This keeps the gears always in line and meshing correctly with each other, and at the same time provides considerable spring support for the motor, which in designing slow-speed locomotives should be looked carefully into, as well as in locomotives for extreme high speed. This is a matter of no small moment in designing such work. The gearing consists of aluminum bronze pinions and mitis iron spur gear wheels. This gearing runs in gear cases, in which a plentiful supply of grease is placed. This decreases the noise and friction, thus increasing the life of the gears very materially. On the intermediate shaft is

position, he pushes the controlling lever from him to make the locomotive go forward, and pulls it toward him, past its vertical line, to make it go backward. A positive center notch or lock is provided, so that in turning the current off there is no danger of passing the neutral point on the rheostat, and so reversing the locomotive with the current on. When the operator stands in the above mentioned position he pushes the brake lever from him in order to apply the brake. The steel bands are so arranged on the brake drum that the friction tends to tighten them up more upon the wood lagging, and so assist the operator in braking the train.

The following data give the detail of construction of this locomotive, the construction of which has been under the direct supervision of the engineers at the works of the builders:

Wheel base.....	6 ft. 4 in.
Diameter of wheels.....	42 in.
Speed reduction between armature and axle ...	1 to 25.
Gauge.....	4 ft. 8½ in. standard.
Wheel base.....	6 ft. 4 in.

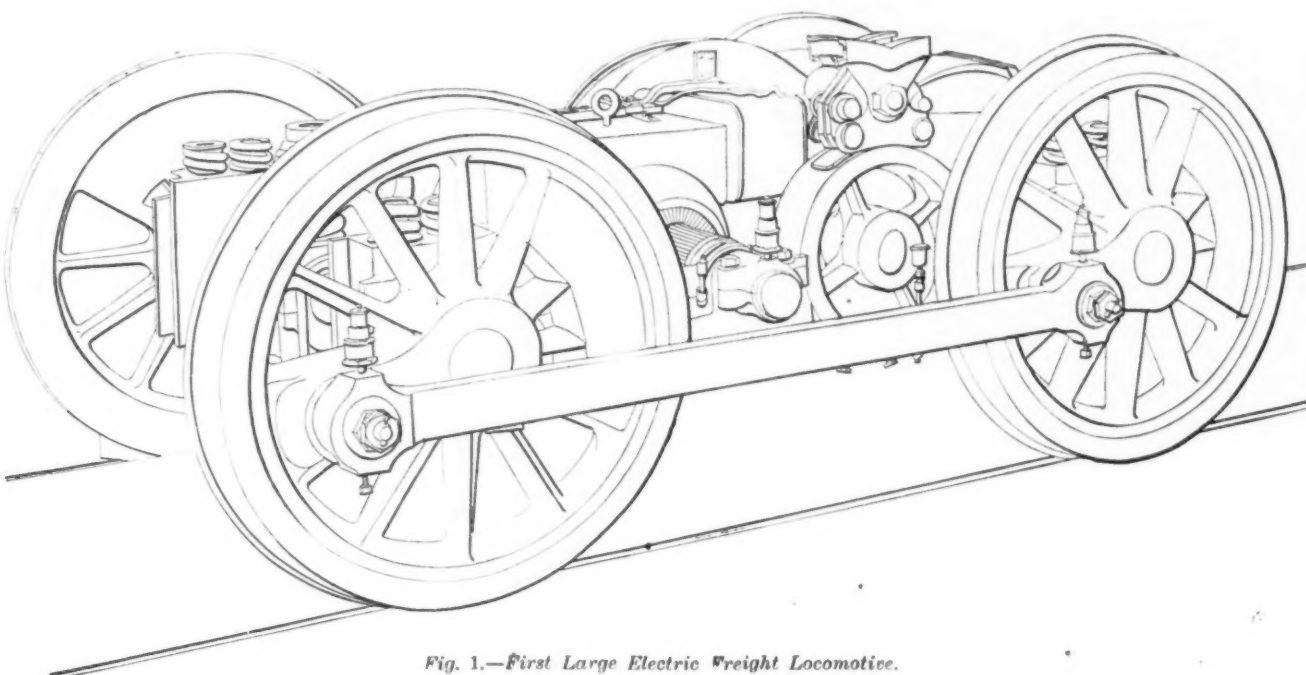


Fig. 1.—First Large Electric Freight Locomotive.

THE ELECTRIC RAILWAY AS APPLIED TO STEAM ROADS.

The other tables give, for the same areas and at speeds from 1 to 120 miles per hour, the tonnage resistance in pounds, the total resistance in pounds per ton and the total resistance in horse-power per ton.

After specifying what the track construction should be for high-speed trains, the author describes "the first large freight electric locomotive displacing steam on a standard gauge railroad," which is shown in Fig. 1

The locomotive is at present running at Whitinsville, Mass., carrying merchandise from the railway freight station to the works of the Whitinsville Machine Company's plant, a distance of 1½ miles. The power is furnished by a large generator located at the machine works, and conveyed over a trolley wire, from which it is taken by means of a universal trolley bar attached to the locomotive. The construction of the truck, &c., is well shown in the engraving, and is built in a square form in three castings, having also a platform for carrying loads, and cow-catchers and draw bars at each end. The motor employed is one of what is called the "G" type of the Thomson Houston Electric Company; the power is communicated from the armature to the rear axle by means of double-reduction gearing, and

heavily keyed a mitis-iron brake drum, which is covered with wood lagging. It is embraced by two half bands of steel, tightened upon it by means of the brake-drum lever, situated in the operating stand or cab.

The wheels are 42 inches in diameter, and are heavily steel tired. The frame consists of two heavy side plates, in which are located the main axle bearing. Two heavy cast-iron plates, in which are cast the cow-catchers, are bolted to the side plates by means of heavy through bolts, which are a driving fit in reamed holes. These end plates carry the heavy spring draw bars and bumpers.

The operating platform or cab is located at one end of the main platform, and is made of pipe frame work and covered with a protecting roof. On this platform are located the lever for operating the controlling mechanism, the brake and the double acting sand boxes. The universal trolley bar also extends upward from the locomotive at this point, as shown.

The controlling mechanism consists of two large rheostats of the Thomson-Houston railway type. These are so arranged with their contact shoes that no reversing switch is needed. The operator stands so that he always faces the direction in which the locomotive is to go, and, being in this

Measured height above rail platform.....	4 ft. 4 in.
Greatest length of locomotive at cow-catcher.....	15 ft. 9½ in.
Greatest length of platform.....	12 ft. 7¼ in.
Greatest width of platform.....	7 ft. 1¼ in.
Weight of complete locomotive, less trolley pole.....	42,525 lbs.
Approximate weight of motor.....	5,400 lbs.

As in street railway work, a combined main switch, lightning arrester and fuse box is placed on the locomotive and within easy reach of the engine driver, so that he can instantly shut the current off from the locomotive by a slight movement of the hand.

The construction of the motor is of the most rigid and water-proof character, the field spools having their wire inclosed entirely, sewed up in canvas cases, which are covered with a heavy coating of water-proof paint.

The locomotive, which weighs 42,525 pounds, or about 21 tons, was designed to operate at 500 volts and to develop 100 horse-power at the draw-bar. This enables it to pull a train of 6 to 12 heavily loaded cars, or an aggregate load of 300 to 500 tons, at a speed of 5 miles per hour on a level with ease.

A. F. Nagle of Chicago, in his paper on
The Density of Water at Different Temperatures,

finds much disagreement in the weight of a certain quantity of water at certain temperatures. "Steam," published by the Babcock & Wilcox Company, gives the maximum density at 39.1°, the weight being 62.424 pounds per cubic foot. Thurston, in "Steam Engine and Boiler Trials," gives maximum density at 39.2 and weight 62.425. The paper closes with tables arranged by the author in which he gives the comparative volume and weights of waters at different temperatures for each degree from 32° to 212°.

An Experimental Locomotive

Erected by the authorities of Purdue University was very fully described by Prof. W. F. M. Goss of Lafayette, Ind.

extending a knowledge of locomotive performance.

The locomotive was built at the Schenectady Works. It is of the eight-wheel type, with 17 x 24 inch cylinders and 63-inch drivers. Its weight is 85,000 pounds, 56,000 pounds being on the drivers.

Fig. 2 gives a partial view of the drivers, supporting wheels and brakes. The bearings of the supporting shafts rest upon well-seasoned oak timbers placed upon a masonry foundation. The supporting wheels are of the same diameter as the drivers and are in other respects similar, save that the cranks and counter weights are omitted. Their faces are turned flat, with the inside edge rounded as in a rail. There are four friction brakes, which provide the load for the supporting shafts, the extensive rubbing surfaces being of cast iron and copper. Excessive wear is prevented by thorough lubrication. The intensity of the brake action is controlled

ing wheels. A tangent wheel and screw are provided for the purpose of turning by hand the forward supporting shaft, and hence the engine, whenever it may be desired to do so, as, for example, for convenience in valve setting.

The truck wheels of the engine rest upon light rails which are fixed at the level of the floor and extend in front of the engine a distance sufficient to allow the whole machine to be moved forward off the supporting wheels. A steam blower located above the engine, but not in pipe connection with it, removes from the room everything that is given out of the locomotive stack without materially changing the draft conditions under which the locomotive is worked.

The boiler is in pipe connection with the fixed boiler supplying steam for the general purposes of the laboratory, so that the locomotive may be used to supply steam to other apparatus, or the fixed

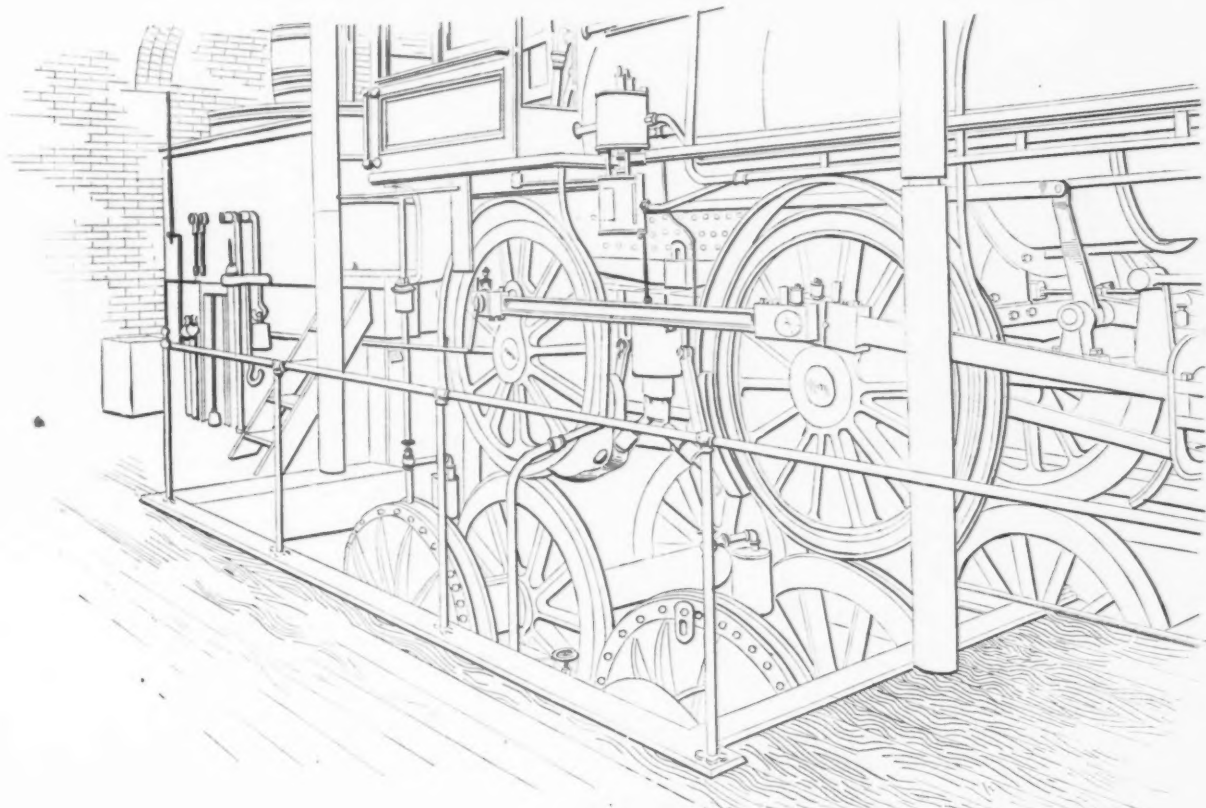


Fig. 2.

AN EXPERIMENTAL LOCOMOTIVE.

The plan of mounting in its inception involved supporting wheels carried by shafts running in fixed bearings to receive the locomotive drivers and to turn with them; brakes which should have sufficient capacity to absorb continuously the maximum power of the locomotive, and which should be mounted on the shafts of the supporting wheels, and a traction dynamometer of such form as would serve to indicate the horizontal moving force, and at the same time allow but a slight horizontal motion of the engine on the supporting wheels. It was believed that a locomotive thus mounted could be run either ahead or aback under any desired load and at any speed; that while thus run its performance could be determined with a degree of accuracy and completeness far exceeding that which it is possible to secure under ordinary conditions of the road; and that the whole apparatus would be extremely valuable to students in steam engineering. It was not thought that every condition of the track would be perfectly met, but it was expected that the results obtained would prove valuable in

by water pressure, by which means the rubbing surfaces are brought into more or less intimate contact, and the heat evolved is carried off by water circulation.

There is no provision for weighing the load at the brakes, where, instead of a weighted lever, anchor rods are used to secure the case of the brakes to the foundation. The entire load shows itself at the dynamometer connected with the draw bar of the locomotive. The dynamometer arrangement is such that whether the engine moves ahead or back, the stress is transmitted by the draw bar, and its value is shown by the weight necessary to balance a lever. The dynamometer levers are carried by a heavy frame work which is well secured to the locomotive foundation and to surrounding parts of the building. Above the levers of the dynamometer, a floor is laid which chiefly serves the purposes of a tender. It gives room for a tank from which the locomotive injectors draw their supply and for the storage of a limited quantity of coal. A telltale is provided to show the position of the locomotive relative to the support-

boiler may be used to supply the locomotive.

The paper describes in detail the supporting shafts, the brakes, the dynamometer and other essential parts.

A paper presented by Prof. C. H. Peabody of Boston was on the

Economy and Efficiency of the Steam Engine.

He stated that while it has been customary to state the performance of a steam engine in pounds of steam per horsepower per hour, this method is open to objection, since the value of a pound of steam depends on the pressure and quality of the steam. The desirability of substituting the British Thermal Unit has been urged to the attention of engineers. This unit, sometimes called the pound degree, is the unit required to raise 1 pound of water 1° of temperature, or, exactly, it is the heat required to raise 1 pound of water from 62° to 63° F., and it is equivalent to 778 foot pounds. This method has a further advantage, inasmuch

as it is applicable to any heat engine, such as a hot-air or gas engine. The method of stating engine performances in British Thermal Units is advocated because it affords a simple and correct way of finding the efficiency of the engine. The ordinary definition of the efficiency makes it a ratio of the heat changed into work to the heat consumed. Now, the horse-power is equivalent to 33,000 foot pounds per minute, equivalent to

$$33,000 \div 778 = 42.42 \text{ B. T. U.}$$

per minute. This constant divided by the heat consumed per horse power per minute will give the actual efficiency of the engine.

In order to show how well an engine is doing it should be compared with the performance of an engine which has no waste or losses—viz., with a perfect engine. If the cylinder walls of an engine could be made of some non-conducting substance, then such an engine could be made to work on the cycle closely resembling that of the perfect engine. The author then goes on to more fully explain the methods to be pursued in ascertaining the perform-

eter than the upper longer series of tubes, and are arranged in the proportions of about 1 square foot to 2 square feet of heating surface, respectively. The furnace is lined with fire brick, which can be detached when desirable, these fire brick being held in place by vertical iron rods, which are protected from the fire, and can be removed and replaced when necessary.

The improvement alluded to consisted in lining the back connection, or combustion chamber, with fire brick in a similar manner to the lining of the furnace. This lining soon attains a high temperature, greatly increasing the efficiency of the boiler by insuring complete combustion of the gases passing through the lower series of tubes and coming in contact with this lining. In the ordinary portable boiler the crown sheet is flat and, although subject to the greatest heat, is the first part exposed to low water. In this boiler the cylindrical crown sheet gives a large effective heating surface and is always protected by water. This boiler has no water sides to fill with sediment, which are difficult to keep clean and liable to

late F. W. Vaughan, C.E., was chief engineer), a considerable amount of medium and high structural steel was used for tension and compression members of the trusses. As the knowledge of such material was very limited at the time of the fabrication of this structure, in 1884-85, it was deemed advisable to investigate the steel in several ways, and to determine the state or condition in which the material was actually used in the bridge.

It was assumed that the material covered the specification requirements, if they were met, not by the rolled shapes in which the material was to be actually used in the bridge, but by the billet test. The results of tests clearly show how erroneous this position is as regards uniformity of material as used in structures. In regard to the effects of annealing, Mr. Henning states "that built sections—box shape with two or three webs—can be annealed without injury or distortion; that I cannot emphasize this fact with sufficient clearness or force in order to contradict statements based on opinions only, and not upon experience or observation." He calls attention to the

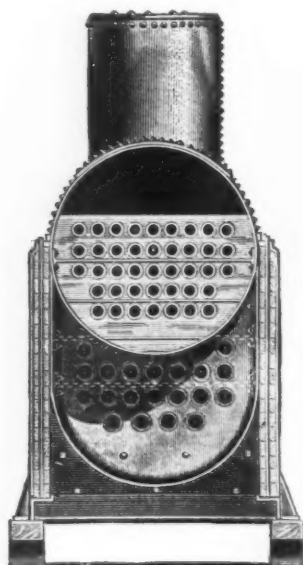


Fig. 3.—Front Sectional Elevation.

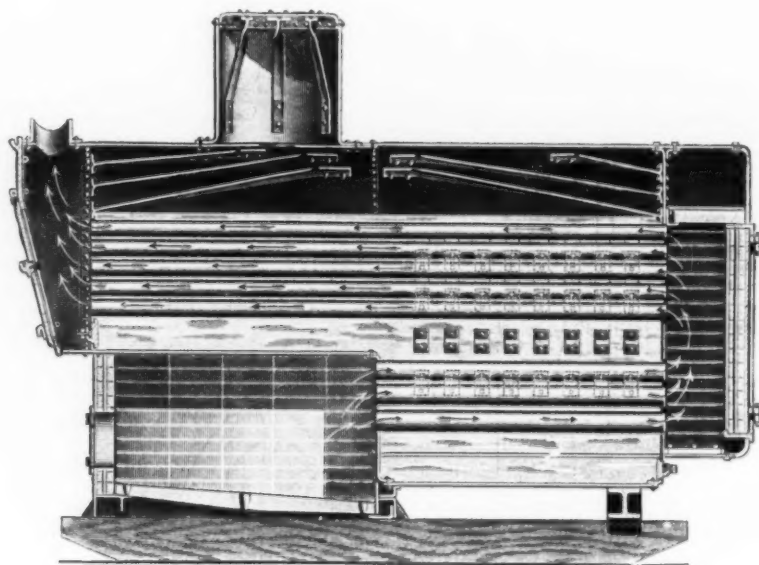


Fig. 4.—Sectional Side Elevation.

SOME TESTS OF A PORTABLE BOILER.

ance of an engine in British thermal units.

Some Tests of a Portable Boiler

were made by Wm. O. Webber of Erie, Pa., to determine: First, the desirability of the changes since made, which have reference to the loss by radiation of heat from the back end, or combustion chamber, of the boiler; secondly, the effect of loss by radiation from the uncovered heating surface of the boiler; and, lastly, the proper size of injector and safety valve required per square foot of heating surface and per square foot of grate surface for boilers of the different sizes, in order to obtain the greatest possible evaporation during a given period.

The boiler, shown in Figs. 3 and 4, might be described as the simplest form of return tubular type, occupying but little space, and combining with the safety of the stationary return tubular boiler the convenience and portability of a portable. The front end of the boiler is cylindrical in form and extends over the furnace, forming the crown sheet. The rear end is oval, the lower portion extending below the cylindrical portion far enough to hold the short tubes leading from the fire box to the back connection. The short tubes in this lower portion are larger in diam-

eter than the upper longer series of tubes, and are arranged in the proportions of about 1 square foot to 2 square feet of heating surface, respectively. The furnace is lined with fire brick, which can be detached when desirable, these fire brick being held in place by vertical iron rods, which are protected from the fire, and can be removed and replaced when necessary.

In regard to the tests, which are fully reported in the paper, the author says that they "will demonstrate, to any one who will take the trouble to compare them with the total weights as given in the table of specifications, that this form and type of boiler will give a very large and efficient total horse-power for a given weight and space occupied. This and the fact that the fire box and back connection castings, together with their respective brick linings, can be readily detached from the boilers and shipped separately, makes this boiler one which can be transported easily to an otherwise nearly inaccessible point."

A paper by Gas C. Henning of New York City was

On the Elastic Curve and Treatment of Structural Steel.

In the construction of the Henderson Bridge, crossing the Ohio River at Henderson, Ky., U. S. A. (and of which the

fact that all corrosion (oxidation) can be prevented absolutely by annealing in a sealed furnace charged with illuminating or other proper and convenient gas. He gives the results of tests, tabulated in such a manner that a ready comparison of the properties of the material in its various shapes or conditions can be made at a glance. Before this, however, he describes the shapes of the test pieces and the methods used in making the tests.

Under the title

The Measurement of Power

Thomas Gray of Terre Haute, Ind., touched upon one of the most important, and at the same time most troublesome, problems in mechanical engineering. The paper briefly describes three forms of dynamometers.

Fig. 5 illustrates a form of dynamometer which may be used either to measure the power given to any machine, as, for instance, a dynamo, or to measure the total power given out by an engine which is driving a number of machines. Suppose that B is the crank shaft of an engine. A crosshead such as, for a different purpose, is here represented by J, is keyed to the shaft, and the pulley P, which in this case is the driving pulley, is connected to the shaft by means of four links, E, M, F, N,

connecting the crosshead to a pair of double bell-crank levers, KLO and CDG, mounted on bearings fixed to the pulley. The ends of the arms O and G bear against one end of a rod, R, passing along the axis of the hollow shaft of the pulley. When the shaft B is turned, two of the arms of the cranks, as F and M or E and N, are pulled toward the crosshead and thus tend to push the rod R outward. This is resisted by the bell-crank lever S, which is supported by a plate resting on a diaphragm which closes the top of the cylinder T. The cylinder T is either partly filled with mercury and partly with water or filled with water and piped to a mercury or other form of pressure gauge placed in any convenient position. The pressure on the end of R is thus resisted by a column of mercury the height of which will be directly as the pressure and inversely as the size of the plate resting on the diaphragm. Thus by finding the indication of the gauge when a known pull or push is applied to S at the point of contact of R, the turning moment exerted by the engine can be calculated for any value of the read-

the disk when no work is being transmitted. In the designs of the dynamometers built for use in the shops of the Rose Polytechnic Institute both the recording pen and the integrating apparatus have been included, but the integrator has not yet been attached to any of them. Arrangements can very easily be made in this particular form for checking the zero, as the thrust of R can be easily taken up by a collar, leaving S free, and thus bringing the pen and friction wheel to zero.

When the dynamometer is used to measure the work given to any particular machine, P becomes the pulley driven by the belt and A the pulley of the machine. The cross bar J is clamped to the pulley, and the action is the same as that just described.

Another form of dynamometer which has been used with good results is illustrated diagrammatically in Fig. 6. In this case let A be the driving and B the driven pulley. Two pulleys, C and D, are mounted on a frame E, and properly supported, so that they can be pulled together on the belt. The frame E is supported by

In the third form of dynamometer two measuring wheels are arranged to bear on the driving belt and just clear the pulley. These wheels communicate their motion to two connecting wheels, one of which carries a dial while the other carries a pointer. Both the dial and pointer are turned in the same direction, so that if both pulleys make the same number of turns, the pointer and the dial turn at the same rate. When the belt is called on to transmit work, however, the tight side of the belt runs faster than the slack side on account of its smaller section. What is commonly known as the elastic creep of the belt is increased, and hence one of the pulleys makes a greater number of turns per minute than the other. Either the dial or the pointer goes ahead, and the rate of gain is proportional to the rate of working, while the total gain in any time is proportional to the total work done in that time. This dynamometer, as it has been made for laboratory use, has provision for adapting the distance between the measuring pulleys so as to fit any size of pulley up to 6 feet in diameter.

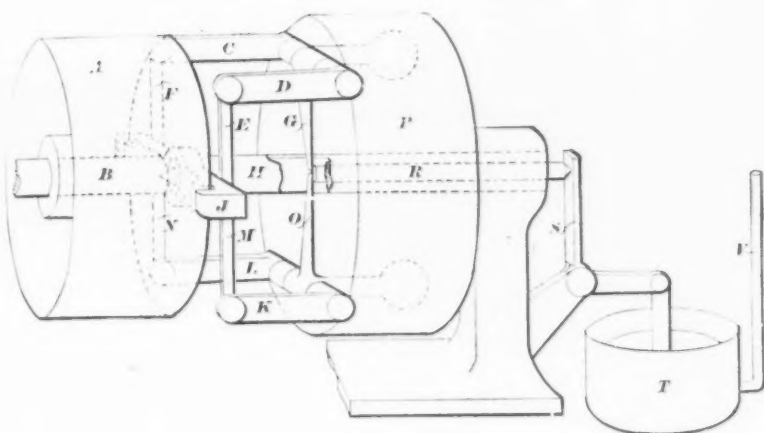


Fig. 5.—Dynamometer.

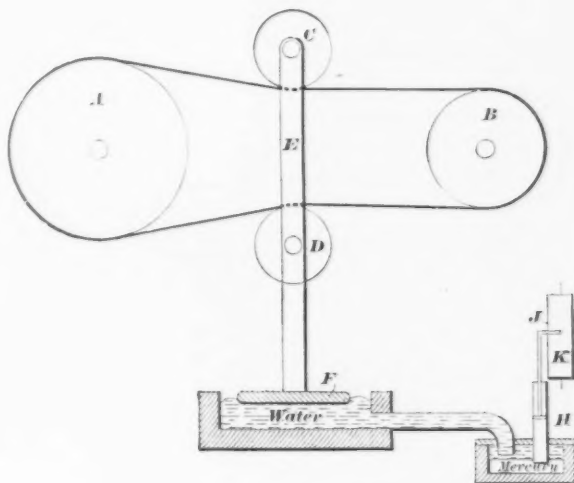


Fig. 6.—Another Form of Dynamometer.

THE MEASUREMENT OF POWER.

ing on the gauge. The effect of centrifugal force on the levers attached to the pulley P must be eliminated, and this is done by counterpoise masses applied as indicated by the dotted lines inside the pulley. When the speed of the engine is known the indications of the pressure gauge give the means of determining the horse power being transmitted at any instant. When a record of the variation of the resistance which the engine experiences is required, the tube V is provided with a float carrying a recording pen, and a record drum is mounted and driven either by clockwork or by the engine itself. In cases like those of electric street-car service very interesting and instructive records are thus obtained, showing the maximum power required and the fluctuations of power which occur in such service. The area of the record between the zero line and the line drawn by the recording pen is proportional to the whole work done in the time during which the record is made. This area can be very accurately and quickly obtained by cutting it out and comparing its weight with that of the same length of the whole breadth of the paper ribbon. A better method of mounting the dynamometer as an energy meter is to mount a light counter on the float and allow one wheel of the counter to be driven by contact with the face of a disk which is driven by the engine. The friction wheel of the counter should be on the center of

means of plate F resting on a diaphragm, as shown. The whole weight of the frame together with the weight of the deflected belt should, however, be independently supported, so that a change of length of the belt while running does not affect the indications. The water under the diaphragm transmits any change of pressure on the plate F to the pressure gauge, which, as in the case above described, may be of any ordinary form if a record is not required. When a record is required a similar method to that described in connection with Fig. 5 may be adopted, and a mercury column gauge is actually used on the instrument under consideration. The lower belt being supposed the driver, it becomes tighter and the upper slacker as the power increases; thus greater pressure is thrown on the plate F. This, however, does not sensibly change the positions of the pulleys or the deflections of the belt, which must be stretched sufficiently to prevent the upper half of the belt becoming slack when the maximum power is being transmitted. This apparatus may be standardized statically by placing a weight on the belt above the pulley D, but when possible it is better to standardize it by causing the machines to do a known or measured amount of work. In many cases this can be readily done by means of a brake. In the case of electrical machinery a definite increase of work may be obtained and measured electrically.

A second paper by Professor Gray described

Autographic Recording Apparatus for use in the Testing of Materials.

This, like several other forms of apparatus which have been contrived for the purpose, draws a double diagram of the change of length of the specimen in comparison with the stress applied during the test. One of these diagrams magnifies the change of length in a ratio varying from 100 to 500 times, according to the adjustment of the apparatus, and is intended only to show the behavior of the specimen for strains below its elastic limit. This range of adjustment for the sensibility enables the full size of the diagram sheet to be taken advantage of for materials varying considerably in their capacity for elastic strain, such, for example, as timber and soft iron. The other diagram is intended to show the relation of the permanent changes of length to the forces producing them. The scale of this diagram can also be varied to suit the circumstances of the case. The paper then describes the machine very fully.

An interesting topic, under the heading

The Utilization of the Power of Ocean Waves,

was very fully treated by Albert W. Stahl, U. S. N., of San Francisco. The first part of the paper sets forth the modern

and generally accepted theory of wave motion, so far as it applies to the subject in hand, and deduces therefrom the logical and most efficient method of utilizing the power of the waves. The question of using the energy existing in ocean waves naturally divides itself into the following parts:

The various motions of the water which may be utilized for power purposes.

The wave motor proper. That is, the portion of the apparatus in direct contact with the water, and receiving and transmitting the energy thereof, together with the mechanism for transmitting this energy to the pumping or other suitable machinery for utilizing the same.

Regulating devices, for obtaining a uniform motion from the irregular and more or less spasmodic action of the waves, as well as for adjusting the apparatus to the state of the tide and condition of the sea.

Storage arrangements for insuring a continuous and uniform output of power during a calm or when the waves are comparatively small.

Taking up first the consideration of the motions that may be utilized for power purposes, we find the following:

Vertical rise and fall of particles at and near the surface.

Horizontal to and-fro motion of particles at and near the surface.

Varying slope of surface of wave.

Impetus of waves rolling up the beach in the form of breakers.

Motion of distorted verticals.

All of these motions, except the last one mentioned, have at various times been proposed to be utilized for power purposes.

The most rational way of utilizing the vertical motion, and the one almost invariably proposed, is by means of a heavy float, Fig. 7, which is secured by a rope to one end of a walking beam, from the other end of which passes a rope so arranged as to utilize the power.

Fig. 8 shows a cylindrical float rising and falling on a central guide pile, the power being transmitted by means of vertical racks. A modification of this has the pump, which is operated by the rise and fall of the float, in the upper part of the guide pile itself, the object being to get all the principal parts as nearly as possible in line.

In Fig. 9 is shown an ellipsoidal float, held at one end of a frame, the other end of which is pivoted to a rigid structure at some point above the water. The motion of the float is transmitted by a rope to suitable pumping mechanism. This device is practically employed at some points on the Eastern coast to pump salt water for street-sprinkling purposes.

Fig. 10 shows a somewhat similar arrangement, the frame carrying the cylindrical float being pivoted below the surface of the water and the shaft to which the frame is attached actuating suitable mechanism by means of a geared sector. This float is, in addition, provided with a curved lip to somewhat confine the water and thus get the full benefit of its momentum.

The main objection to floats operated by this vertical motion of the water may be briefly stated. In the first place, the quantity of power that can be obtained by a float covering any given area of water, and rising and falling through a certain distance, is directly proportional to the weight of such float, as the number of foot pounds of energy for each wave is simply the weight of the float in pounds multiplied by its rise or fall in feet. With a wave of given height, then, the amount of power obtainable from such float can only be increased by increasing the weight of the latter. This weight may be increased in either of two ways—by making the float heavier per square foot of water area covered, as by using heavier material or by increasing the amount of ballast carried;

by keeping the weight per square foot unaltered, but increasing the area of water covered by the float. Either of these methods is, however, attended with a loss of efficiency.

above the water, the lower end of the vane dipping into the water to a certain limited extent and being actuated by the horizontal component of the motion of the particles at and near the surface. The effi-

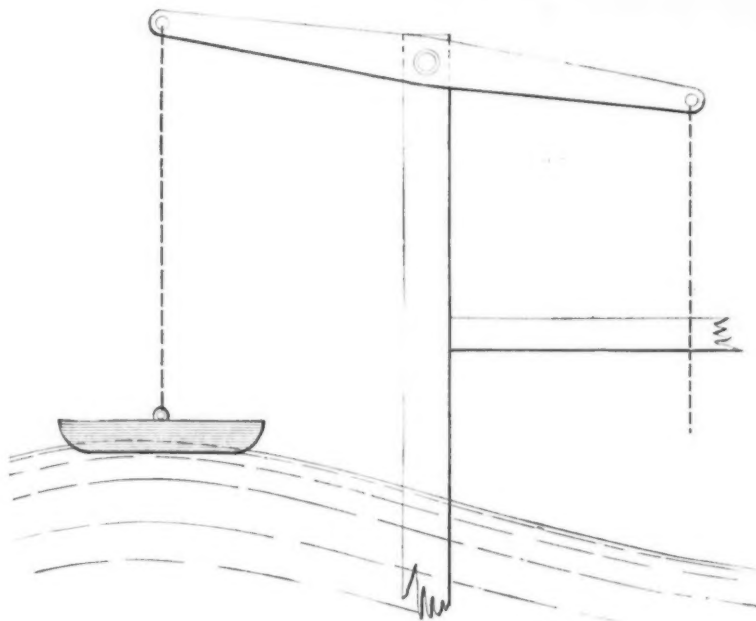


Fig. 7.—Heavy Float.

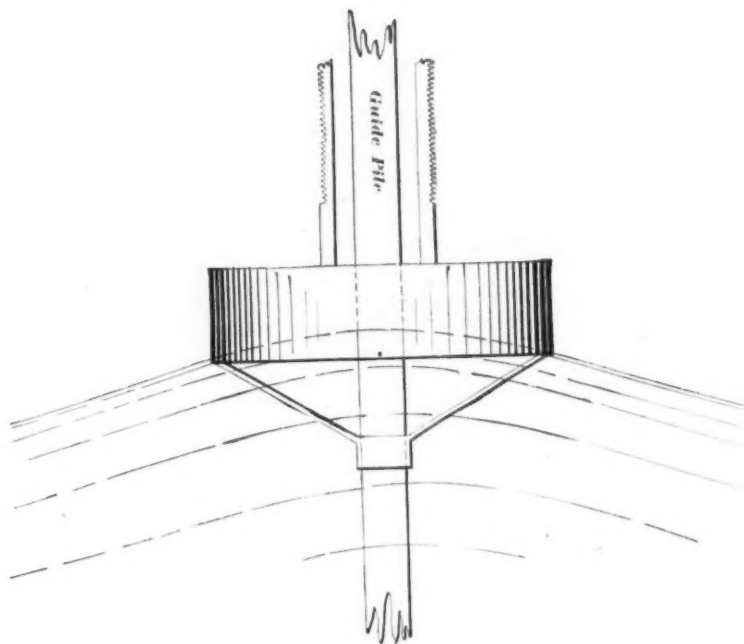


Fig. 8.—Cylindrical Float.

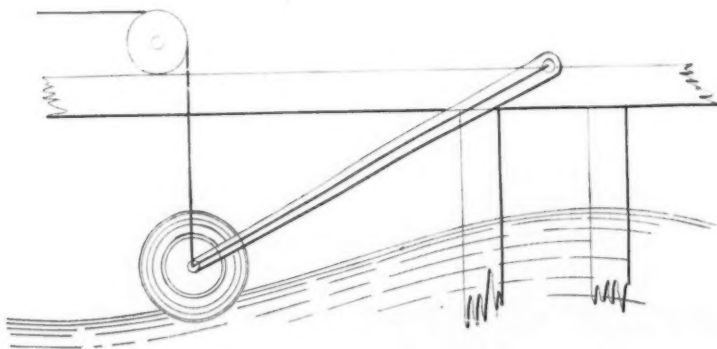


Fig. 9.—Ellipsoidal Float.

THE UTILIZATION OF THE POWER OF OCEAN WAVES.

The simplest arrangement for utilizing the horizontal to and fro motion of particles at and near the surface consists in suspending a vertical flat vane, from some point

efficiency of this device is hampered by the fact that while at first sight it would seem that the amount of power thereby obtained would, with a given breadth of

vane, be directly proportional to the depth of immersion of the lower end of the vane, yet it is evident that the deeper the immersion of the vane the less efficient the apparatus would be. For the vane has an angular motion about its point of support, its lower immersed end moving through a greater distance than the portion at the

the natural relative motions of the particles of water in contact with those portions; so that as such vane extends deeper into the water, it becomes less efficient.

A device proposed for utilizing the varying angle between two portions of the surface some distance apart in the direction of the length of the wave is illustrated in

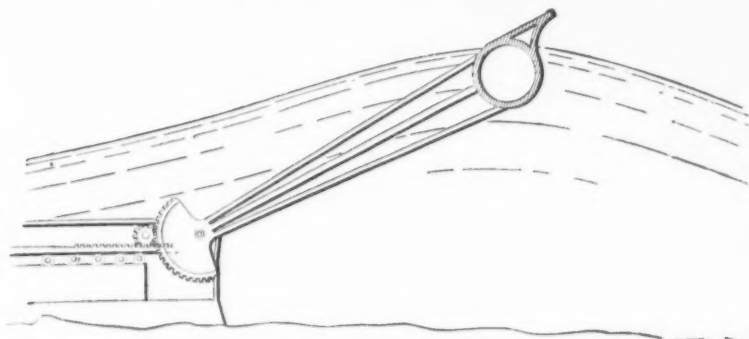


Fig. 10.—Float on Geared Arm.

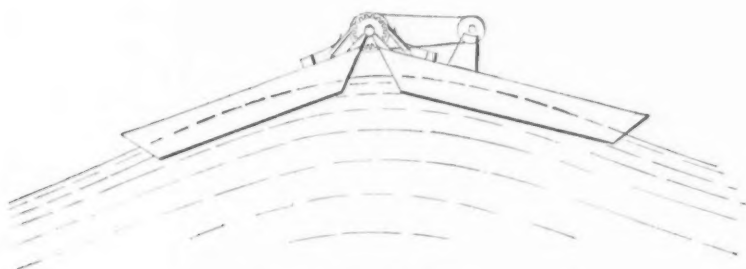


Fig. 11.—Hinged Floats.

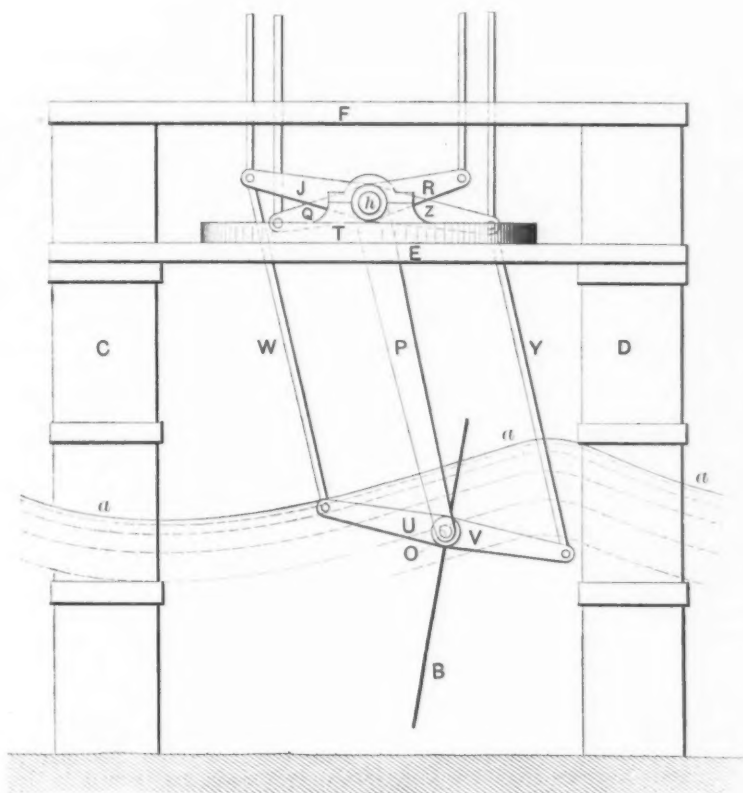


Fig. 12.—Method of Utilizing Distorted Verticals.

THE UTILIZATION OF THE POWER OF OCEAN WAVES.

surface The horizontal motion of the particles is greatest at the surface and becomes less as the respective particles are further below the surface. The relative motions of the upper and lower portions of the vane are thus exactly the reverse of

Fig. 11. It consists of two floats hinged together as shown. As the floats ride on opposite sides of the crest of a wave, their outer ends are lower than their inner ends, while in the trough of a wave this condition is reversed. The angular motion of the floats

relative to each other is employed to operate a ratchet wheel as shown, from which the power is transmitted to any suitable mechanism.

The difficulty with this device is also due to the varying length of the waves from day to day. It is evident that if the length of the floats or pontoons be too short in comparison with the length of the wave, the angle between them will be very slight and but little power will be obtained. On the other hand, if they are too long, the angle is again diminished and the same difficulty presents itself. Thus a pair of such pontoons, of proper lengths to give their greatest efficiency for a certain length of wave, would be much less efficient for a wave one-half as long or double as long.

The writer closes by a very exhaustive discussion of the utilization of the motion of the distorted verticals. One of the methods here proposed consists in uniting the lower edge of the vane to a shaft placed beneath the surface, connecting rods being attached to the upper edge.

In Fig. 12 *a a a* is the wave profile and *B* is a vane of the kind just referred to. The vane is suspended at the points *O* by crank arms *P* at each end, these crank arms having an axis of rotation, *h*, at their upper ends and the vane being free to revolve in bearings, *O*, at their lower ends. Thus as the vane is caused to move in alternately opposite directions by the passage of a wave that portion of the total power which is due to the translation or displacement of the vane as a whole causes the crank arms *P* to vibrate from side to side, the amplitude and energy of such vibration depending on the size of the wave. But in addition to this motion of translation as a whole the vane also rotates about its axis *O* in order to adjust itself to the general direction of the distorted verticals. The cranks *U V* are therefore rigidly secured to the vane at the point *O*. To the end of each of these cranks is joined a link, *W* and *Y* respectively, of the same length as the crank arm *P*, these links being jointed at their upper ends to the cranks *J* and *Z* respectively. These cranks *J* and *Z* are the same length as the cranks *U* and *V*, and are free to turn about the axis *h*. Thus as the vane is caused to move in alternately opposite directions by the passage of the wave, that portion of the total power which is due to the rotation of the vane about a horizontal axis to adjust itself to the general direction of the distorted verticals causes an equal rotation to be imparted to the cranks *J* and *Z*. The total power due to the motion of the vane is thus employed to give motion to the crank arms *P* and to the cranks *J* and *Z*. These motions may then be transmitted to suitable pumping or other mechanism for utilizing or storing this power by any of the ordinary suitable mechanical connections. Thus in the figure the cranks *Q* and *R*, each provided with a connecting rod, are shown rigidly secured to the crank arms *P*, and connecting rods are jointed to the cranks *U* and *V*, but any other mechanical equivalents may be substituted if preferred.

Two-Cylinder vs. Multi-Cylinder Engines

was the title of a paper by S. M. Green of Holyoke and G. I. Rockwood of Worcester, Mass. Introducing the subject, the authors say:

"In a recent issue of a technical journal the theory was advanced by Mr. Rockwood that more than two cylinders in a compound 'multi-cylinder' engine were unnecessary to secure the highest theoretical economy in the use of steam. This proposition was severely criticised and declared to be inconsistent with the modern philosophy of the steam engine. It may therefore be interesting to the members of the society to give their attention to an

account of a series of tests of a triple-expansion engine, so constructed as to permit 'cutting out of the circuit' the intermediate cylinder and running the high-pressure and low-pressure cylinders as a two-cylinder compound, using the same conditions of initial steam pressure and load."

The engine is a triple-expansion condensing engine, designed by George I. Rockwood for the Merrick Thread Company, Holyoke, Mass., and built by the Wheelock Engine Company, Worcester, Mass. The high-pressure and intermediate cylinders are tandem on one frame, the low-pressure cylinder occupying the right-hand position to an observer standing at the cylinder and looking toward the shaft.

The relative proportions of the cylinders are somewhat novel. As the objects of the designer were to secure an engine of symmetrical appearance, of uniform turning moment at each crank, and of highest attainable steam efficiency, and also to make it possible to run the low-pressure

connecting the governor with the cut-off mechanism on the low-pressure cylinder.

Dimensions of Engine.

	High pressure.	Inter-mediate.	Low pressure.
	Inches.	Inches.	Inches.
Diameter of cylinder..	12	16	24 13-32
Diameter of piston rod 2 and 3/4	2 3/4	3 1/2	3 3/4
Stroke of piston.....	36	36	48
Clearance in percent- age of piston dis- placement, per cent.	2	4	3
Inside diameter steam pipe.....	5	6	9
Inside diameter ex- haust pipe.....	6	7	10
Area of steam port	13	21	38
Area of exhaust port..	16.5	25	60

The paper then describes the method of testing, the results being tabulated as follows:

General Results of Four Tests of a Triple-Compound Engine, Run Both as a Triple and as a Double Compound.

Test.	Engine.	Duration, hours.	R. P. M.	Average steam- pipe pressure.	Average indicated horse- power.	Water per indicated horse- power per hour.	Dry steam per indicated horse- power per hour.	Weight of water used in jackets per hour.
A . .	12 × 36 24 13/32 × 48	5 (7-12)	79.2	142	187.11	Pounds. 13.41	Pounds. 13.06	Pounds. 390.3
B....	12 × 36 24 13/32 × 48	5 (1-6)	79.3	142	180.71	13.11	12.76	390.3
C....	12 × 36 24 13/32 × 48	5 (7-12)	79.0	142	190.08	13.01	12.67	416.0
D....	12 × 36 24 13/32 × 48	5 (1-6)	79.0	143	178.16	13.25	12.90	388.8

side with high-pressure steam, in case of accident to the high-pressure side, the tandem cylinders were made of shorter stroke than that of the low-pressure cylinder. The high-pressure cylinder was put next to the frame. The exhaust steam from the high-pressure cylinder passes directly into a receiver of the tubular reheater variety, and thence directly into the intermediate cylinder. Another similar receiver lies between the intermediate and low-pressure cylinders. These two receivers are so connected that the exhaust from the high-pressure cylinder may pass through both into the low-pressure cylinder without going through the intermediate cylinder, the steam and exhaust pipes of which are provided with valves. The first and second cylinders are jacketed on heads and barrels; the heads only of the low-pressure cylinder are jacketed, and all receiver and cylinder jackets contain steam at full boiler pressure. The cylinder jackets consist of cored spaces. The jacket drips all collect into one pipe 1 1/2-inches in diameter, which discharges into a reservoir, whence it is returned through a steam loop to the boiler, and in no instance are the jackets connected with the cylinder steam chests.

The valve gear of the high-pressure cylinder is of a new type, designed to operate gridiron valves under heavy pressures. The valve gears of the intermediate and low-pressure cylinders are, in all respects, such as have been used heretofore on engines built by the Wheelock Engine Company. The governor operates only upon the cut-off mechanism of the high-pressure cylinder, the releasing gears of the other two cylinders having independent hand adjustments. In case of accident to the high pressure side of the engine, however, means are provided for

Of these results it is said: "They are practically identical, and would seem to support Mr. Rockwood's theory that the receiver may be so constructed as to take the place of the intermediate cylinder or cylinders of the multi-cylinder engine. As these tests were held so shortly before the spring meeting of the society, the time allowed in which to prepare this paper was much too limited to admit of the exhaustive treatment which the importance of the subject demands. It is hoped that at the next meeting the results of further trials, together with their proper analyses, may be presented for further consideration. But the results of these tests, it is believed, show an economical performance surpassing the best records hitherto published in this country, and clearly indicate that more than two cylinders are unnecessary to secure the highest attainable economy in the use of steam."

James Bowron, secretary and treasurer of the Tennessee Coal, Iron and Railway Company, in speaking of the meeting of the stockholders held on the 10th inst., says: "Many different statements have appeared in the papers with more or less air of authority, which have been in fact unauthorized and incorrect. All that can correctly be said of the meeting is that the stockholders voted upon and unanimously ratified the action of the directors looking to the purchase of the property of the DeBardeleben Coal and Iron Company, and also giving authority to the directors to acquire the property of the Cahaba Coal Mining Company. The two companies will be brought under one management as quickly as the proper steps to that end can be completed. The stockholders will meet again in Tracy City on June 20, to

take action with reference to the proposed Cahaba trade. The matter of manufacturing steel is receiving the careful consideration of the directors, with a view of doing what is believed to be to the best interest of the company."

The Colorado Iron Works.

The principal foundry and machine shop of Denver is that of the Colorado Iron Works, of which J. W. Nesmith is president, Mrs. Isabel Nesmith-Evans is treasurer and J. H. Morcum is superintendent, S. H. Nesmith being assistant to the superintendent. The works were organized in 1876, but it was not until the end of 1878 that J. W. Nesmith became connected with the establishment, which he now virtually controls and which he has brought to its present flourishing condition. The company make a specialty of mining and milling machinery and doing some local architectural work. Particular attention has been paid to the building of silver-lead smelting plants, the water jackets, &c., for furnaces varying in size from 30 to 36 inches by 80 to 120 inches at the tuyeres and fluctuating in height from 18 to 20 feet. A good deal of work is done in furnace equipments like slag cars, the latest development being to make the slag pots of pressed steel plates. A special design of slag cars for conveying the liquid slag to the dumps and pouring it, consisting of two pots mounted on a pivoting center on a four-wheel car, is now being generally adopted. The Colorado Iron Works make also rolls, crushers, stamp mill shoes and machinery. The Perfection table is an end-pumping sluice table used for the concentration of the pyrites from gold mills, a number of them having been put into the famous Homestake Mill in the Black Hills.

The works embrace a 100 x 115 foot foundry, well lighted and arranged, with three cupolas, one 72 inches, one 52 inches and one 38 inches in the clear. A good deal of scrap is melted with the aid of high-silicon pig, the capacity being 20 tons per day. The machine shop is 100 x 115 feet and is well fitted with tools. A pattern shop is 60 x 100 feet, and a forge with a modern hammer is used for forging from scrap and steel blooms, as the requirements of the article produced may call for. The facilities for handling and shipping in the yard are particularly handy.

The office is noteworthy as a neat, commodious and well-lighted room. Mr. Nesmith has developed a very elaborate and careful system of accounting. Estimates in detail are made on each job, which are subsequently compared with the exact cost as determined finally from the close records kept. Practically the work done by each man in the foundry, for instance, can be closely watched from the returns. Mr. Nesmith attributes a large measure of his success to this system.

Fifty-two years ago the first postage stamp ever made was issued in England. The amount of stamps used at present in the civilized world is stupendous. The three countries sending the greatest number of letters through the mail are the United States, Great Britain and Germany. According to the report of the International Bureau of the Universal Postal Union, the annual receipts from postage stamps are as follows: United States, 298,713,598 francs; German Empire, 223,320,611 francs; Great Britain, 235,993,950 francs. The entire annual postal receipts of these countries are as follows: German Empire, 317,426,566 francs; United States, 315,451,284 francs; Great Britain, 246,276,950.

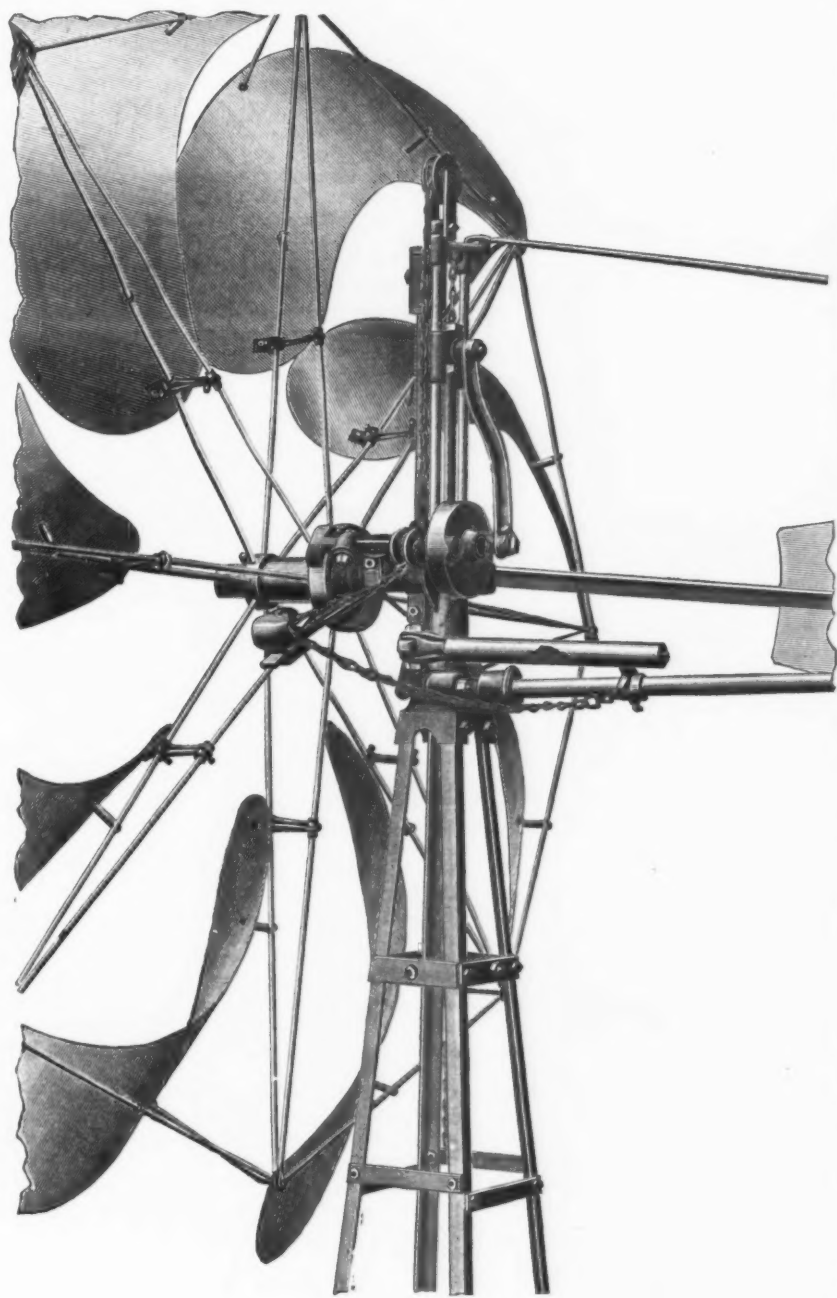
The Columbia Steel Windmill.

The steel windmill of which an engraving is here presented possesses many features tending to increase its efficiency and durability. The frame of the wheel is constructed of drawn steel rods, the spokes bracing in both directions from the rim, which is directly over the center of the hub, which, while allowing a degree of elasticity to the wheel, renders it impossi-

side of the hub, and secured also by two steel set screws. The hub is hollow and projects back over the box so that the weight of the wheel is supported by the entire length of the shaft in its bearing. The main shaft is of first quality steel shafting, and to it is attached the internal gear pinion, which in turn drives the internal gear wheel to which is attached the pitman. The pitman is connected at the upper end to the crosshead, which runs on

the power of the wheel when compared with a direct geared mill. The gearing is entirely protected from exposure to the weather.

The governing of the mill is secured by the action of the wind on the wheel, and by the direct pressure of the wind on a side vane equalizing the pressure of the wind on the opposite side of the wheel, in connection with an auxiliary spring, a uniform speed of the wheel is maintained in winds of varying intensity, and affording the wheel protection in storms. These mills, which are made 8 or 10 feet in diameter, are manufactured by Mast, Foss & Co. of Springfield, Ohio.



THE COLUMBIA STEEL WINDMILL.

ble for the wheel to collapse in any direction.

The fans are secured to the frame of the wheel in such manner as to form a true spiral, presenting an angle of 45° to the wind at the inner end of the fan, gradually increasing the angle to 80° at the rim of the wheel, thereby presenting the best possible angle to the wind at every part of the fan when considered relative to the action of the wind on the wheel when the wheel is in motion; also providing for the best clearance of the wind in passing through the wheel, avoiding entirely the back suction so noticeable in some makes. The hub is clamped to the main shaft with a bolt passing through the shaft and one

parallel guides made of steel shafting and contains swivel of actuating pipe. It will be noticed that this plan of gear carries the pitman on an almost perpendicular line when the windmill is doing its heaviest work on the up stroke of the pumping rods; also that it brings the entire gear close to the center of the turntable, obtaining the greatest strength for a given weight of material used in its construction. By the use of the internal gear device the speed of the wheel is reduced to the normal speed at which it is practicable to operate a pump in a well of any depth and overcome the back lash on the dead center, which is the objection to outside or spur gears, and more than double

The Tharsis Sulphur and Copper Company.

At the annual meeting of the Tharsis Sulphur and Copper Company, at Glasgow, April 20, Sir Charles Tennant, chairman of the company, said the results of the past year had been extremely unsatisfactory, owing to the low price of copper, an article which, he said, had become in late years a very speculative article of commerce. Sir Charles continued: "A very disturbing element in values has been the introduction of refined copper from America, which has been sold cheap, and has taken the place of conductivity and best select, of which we have always been large producers, thus depriving us of the good margin formerly obtained for these qualities over that of tough cake. We had further to face a fall of $\frac{1}{2}$ penny per unit, or 2 shillings per ton, on sulphur; nearly 1 shilling per ton on our iron ore, owing to the stoppage of the blast furnaces in our neighborhood, and a gradual decline in the value of silver. The result is that we have a falling off in our net profit of, in round numbers, £122,000, which, you will see, accounts completely, if not satisfactorily, for the diminution of dividend. The profits on gold and silver, notwithstanding the fall in silver, are about the same as those of the previous year, and are not unsatisfactory. The balance to the credit of profit and loss is 1 per cent., carrying over £19,280, or about £3000 more than had been brought in from the previous year. I will now say a few words on our prospects for the current year. Our contracts for pyrites are for about the same quantity and at the same price. Of iron ore our sales are considerable, and if taken the delivery of them should prevent an increase in our stocks. As to copper, our reservoirs at the mines are full, so that our production should at least equal that of last year. The price likely to be obtained is the difficult question. The visible stock at the beginning of this month was smaller than it has been at any time during the past three years. The future, however, will chiefly depend on the quantity sent to us from America. It seems fair to conclude that the low prices of the last year were not remunerative to their mines, as we hear of proposals from them to limit their production and export on certain conditions with a view to bringing about an advance. Whether they will succeed in coming to the necessary agreement remains to be seen. Meantime, the market has been rather more active, at a slight advance in price, and we must hope that this improvement may continue." Sir Charles asked the consent of shareholders to a dividend of 12½ per cent., in place of 22½ per cent. a year ago.

Ex-Minister Smith, just returned from Russia, confirms the report that the distress in the famine districts continues, with urgent demand for help on the part of not less than 5,000,000 starving peasants. Besides food large sums of money will be needed to replace the thousands of work animals that have perished.

The Sellers Turning and Boring Lathe for 16 Inch B. L. R.

William Sellers & Co. (Incorporated) of Philadelphia have finished and shipped to the Washington Navy Yard the largest lathe ever built in this country and perhaps in the world. The lathe is intended for turning and boring 16-inch breech-loading rifles and is designed, especially, to permit the use of a broad, flat turning tool, fed at right angles to the axis of the gun, which involves very powerful feeding gear and a quick traverse for moving the tool carriages and slide rests. From the specifications we take the following description of the main features:

The Bed.

The bed consists of a wide part for the headstock, tool carriages and steady rests, 73 feet 10½ inches long, 9 feet wide by 2 feet deep, made in two sections bolted and keyed together; and of a narrower part to support the boring bench, 54 feet 5 inches long, 5 feet 2 inches wide by 2 feet deep, in two sections bolted and keyed together, and to the main bed. The wide part, or main bed, has four ways, Fig. 4, two of which carry the tool carriage on one side, and the other two serve to hold the steady rest and tailstock on the other side. The middle ways are formed in one section of metal, with a diagonal slot between them for clamping bolts to hold the steady rests and tailstock. The narrower part, or boring bed, has no slot, and the boring bench is clamped to it by outside shoes.

The Headstock.

The headstock, Figs. 2 and 3, carries three spindles of forged steel, viz., the main spindle, the back-gear spindle and the cone spindle, or face-plate pinion shaft. The front bearing of the main spindle is 20 inches in diameter by 32 inches long, its rear bearing is 14 inches diameter by 24 inches long; distance between center of bearings 6 feet 9 inches. All these spindles run in solid bronze bushings, carefully fitted to the headstock and caps, and firmly clamped by the latter. The front end of the main spindle carries the face plate, fitting tight on the nose of the spindle, and further secured to a collar on the same by large tight-fitting steel bolts.

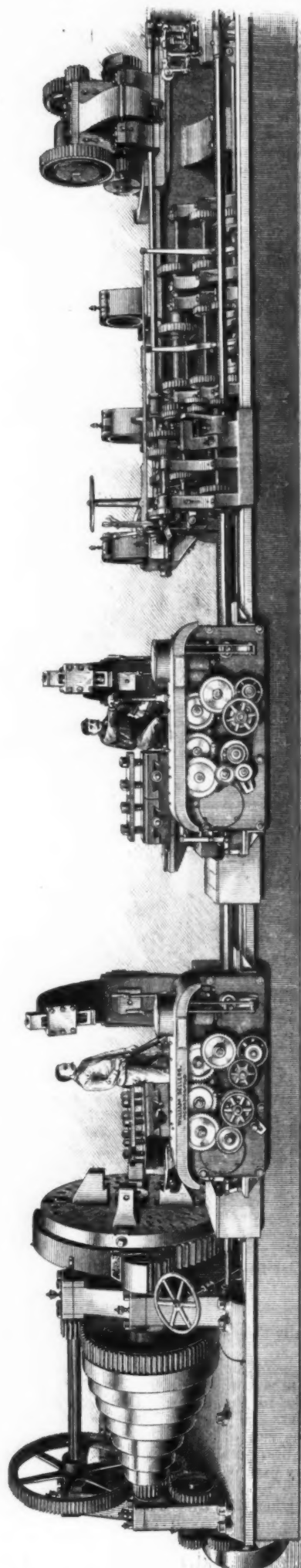
The cone pulley is carried on a sleeve on the face plate pinion shaft, which has a front bearing 9 inches in diameter by 19 inches long, and a rear bearing 6½ inches in diameter by 14 inches long. The cone pinion of tough bronze has a projecting hub with a flanged collar, which is connected with the cone by a breaking pin.

The cone has seven steps for an 8-inch double belt ranging from 20 inches for the smallest diameters to 60 inches for the largest.

The face plate pinion has 15 teeth, 4 inches pitch and 10½ inches face, and is keyed to its shaft. Between it and the cone on the same shaft is keyed a larger spur gear. The back gear shaft is above and behind the cone, has a front bearing 6 inches in diameter by 19 inches long, and a rear bearing 6 inches in diameter by 14 inches long. Between these bearings it carries, at the rear, a large spur gear which engages the cone pinion, and at the front a pinion engaging the spur gear on the face-plate pinion shaft.

The face plate is of cast steel, and is provided with four adjustable steel jaws, and a gear wheel having 75 teeth of 4 inches pitch and 10½ inches face. The ways for the jaws serve as braces between the exterior and interior rings of the face plate, making it exceptionally strong.

By running the countershaft at 180 and at 216 revolutions per minute respectively, 14 speeds of the face plate are obtained,



THE SELLERS TURNING AND BORING LATHE FOR 16-INCH BREECH LOADING RIFLES.

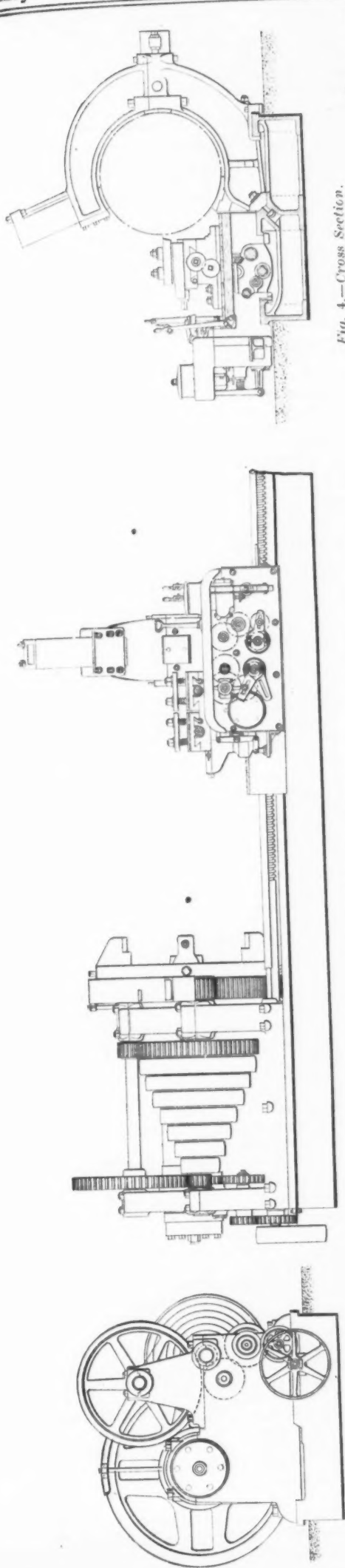


Fig. 4. - Cross Section.

Fig. 3. - Side Elevation.

Fig. 2. - End Elevation.

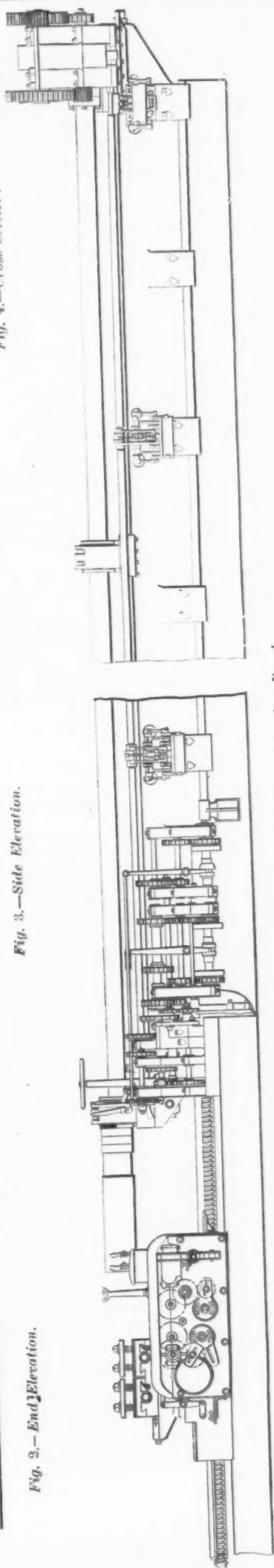


Fig. 5. - Side Elevation of Boring Bench.

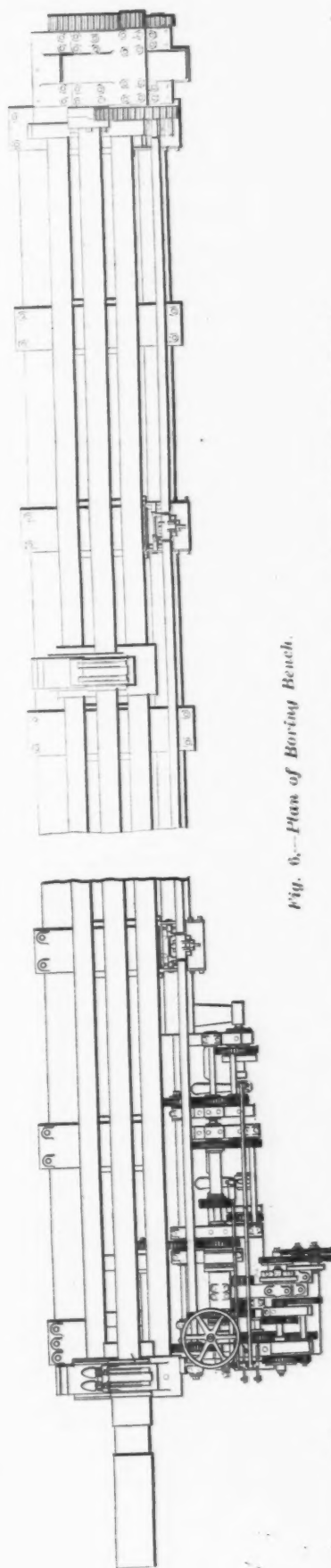


Fig. 6. - Plan of Boring Bench.

THE SELLERS TURNING AND BORING LATHE FOR 16-INCH BREECH LOADING RIFLES.

ranging by practically exact geometrical progression from 0.4 revolution to 4.8 revolutions per minute, with a safe cutting pressure of 140,000 pounds on a 50-inch diameter, and on the lowest speed. The main casting of the headstock spreads over the whole width of the bed and is rigidly continuous between the bearings of the main spindle, thus being enormously stiff for strains in all directions.

Height of center over surfaces of bed, 4 feet.

Tool Carriages.

The tool carriage, Figs. 3, 4 and 5, consists of a saddle sliding directly on the bed, and a cross slide, provided with a slide rest, adjustable about a vertical axis which carries two tool rests with independent cross adjustment. The saddle slides on the two front ways of the bed, to both of which it is held down by inside shoes, and it is guided for a length of 9 feet by the front way, on which the thrust of the cut is taken. The axis of the adjustable slide rest is 1 foot out of center toward the headstock end, to bring the tool slides as close as possible to the face plate.

The saddle is fed and also run rapidly along the bed by a long nut revolving on a 6 inch steel screw, fixed at one end in the headstock and at the other in the far end of the wide part of the bed. This nut receives its feed motion from a square feed shaft along the bed, driven by constant gears on the headstock, and its quick traverse from a similar shaft driven at a constant speed by a pulley at the headstock end of the bed, which gives a traverse controlled by hand of 20 feet per minute to the tool carriage. By this construction the quick traverse on one carriage can be instantly operated in either direction so soon as the feeding clutch is disengaged, and without disturbing the other carriage, whether this be screw cutting or turning.

As two carriages are provided with this lathe, their individual traverse is necessarily reduced in consequence, but it is sufficient either for work at the face plate in one direction or for screw cutting or facing in the other. Ample clearance is provided at the foot of the lathe between the muzzle of the longest gun and tool post.

The swing over the carriage is 70 inches in diameter.

All changes for feeds and screw cutting are made on the saddle, thus making the two tool carriages entirely independent of each other in all of their movements.

The cross slide is fed by a 3 inch steel screw, also receiving its motion from the square feed shaft in the bed.

By feeding the cross slide and saddle simultaneously, and changing their relative amounts, the following tapers may be obtained by change gears:

(1 or 10) in 20-24-28-30-34-35-36-38-40-45-48-50-54-55-58-60-64-70-75-80, and (1 or 10) in twice the above values.

By extra change gears almost any desired taper may be obtained.

The following longitudinal feeds of saddle may be obtained by change gears furnished:

From 0.02 inch to 0.1 inch, varying by 0.01 inch; from 0.1 inch to 1 inch, varying by 0.1 inch, and from 1 inch to 3 inches, varying by 0.25 inch, also, 0.75 inch, 0.85 inch, 0.95 inch and 1.35 inches.

For screw cutting, the carriage is intended to be run back by the quick traverse after each cut, and an indicator is provided to show the proper time for throwing the screw cutting clutch into gear; this indicator can also be used for spacing the threads when cutting screws of more than one thread.

If the pitches to be cut vary by twentieths of an inch, the indicator will cover them exactly, and any subdivision of such a pitch can be cut with the indi-

cator set for that pitch. The indicator can, therefore, be used to advantage for pitches varying by hundredths of an inch, and thus provide for all practical requirements. For turning, all the feeding movements of all the slide rests are also operated by the quick traverse, so that whatever feed is being used the tool can be run back to its starting point by a quick traverse, operating through a friction clutch controlled by the operator.

The rapid traverse lever and the longitudinal feed levers are so interlocked that they cannot be thrown in simultaneously.

The safe feeding pressure for longitudinal traverse is estimated at 82,300 pounds for a feed of 3 inches or less. The cross feed varies from 33,000 pounds for 3 inch pitch to 100,000 pounds for fine feeds. The feed for top slide varies from 25,000 pounds for 3-inch pitch to 35,000 pounds for 2-inch pitch or less. All the permanent feed gears are large and carried on stiff shafts between ample bearings, the change gears only are overhung, and all are arranged to distribute the pressures so as to insure durability and easy running. The two square shafts, and the long feed screw in the bed, are supported at proper intervals by tumbler bearings provided with caps, and all are automatically opened and closed by the tool carriage as it passes by.

The ways on the bed on which the carriage slides are entirely independent of those which support the steady rests (and the tailstock when used), and the carriage, as designed, can be traversed from end to end of the turning bed, regardless of the number or position of the steady rests in use, and without removing any parts of the carriage.

Steady Rests.

The 16 inch gun lathe is provided with four steady rests, Figs. 3 and 4, to take in respectively 61 inches, 54 inches, 40 inches and 27 inches.

The frame consists of a lower half bolted by the diagonal slot to the bed and clamped to the back of the bed by a shoe. This part of the frame carries the lower jaw and embraces the horizontal adjustable jaw back of the lathe center. The upper half of the frame fits over this jaw and is bolted securely to the lower half by heavy steel bolts. It carries at its extremity another adjustable jaw at an angle of 20° to the perpendicular. The lower jaw is adjustable at the same angle, and thus the jaws of the steady rest embrace an arc of 220° plus the length of one block in degrees.

The traverse of the steady rest is accomplished by coupling to a bar on the tool carriage, which serves either to push or pull them as required. The same bar is used also to move the tailstock on the turning lathes. When not in use this bar is unshipped to permit tool carriage to pass the rests.

Tailstock.

The tailstock rests upon the two ways at the back of the bed, and is bolted to the diagonal slot (used also to fasten down steady rests) by six 2½ inch steel bolts with long T-shaped heads. It is provided with a steel spindle, 14 inches diameter, and a steel center, 8 inches diameter. The spindle is conveniently adjustable from the front end of the tailstock, and is capable of being clamped firmly in its bearing. (By removing the spindle and thrust block, the tailstock may be used, if desired, as a boring bar support.) The tailstock is moved along the bed by the turning carriage, as explained under head of steady rest. The tailstock is entirely clear of the ways upon which the carriage moves, so that the carriage may be run entirely past it, if desired. This construction en-

ables the tail stock to have its base project forward under the center, avoiding all oversetting tendency, and enables the tool carriage to face off the end of the gun with the minimum projection of the tailstock spindle.

Boring Arrangement.

The boring bench, Figs. 5 and 6, is made in two sections, and is adjustable on the bed by power acting through a revolving nut on the 6 inch steel screw in the main bed. It is clamped to the outside of its bed by shoes. All the mechanism required for moving the boring bench, for boring feeds and for quick traverse of the boring bar is bolted to the front side of the boring bench at the end nearest the face plate, its frame work being also supported by the two front shears of the main bed and sliding upon them when the bench is moved. This mechanism is driven by the feed and quick traverse shafts in the main bed, so that no motive power, shafting or counters are required except at the head of the lathe.

The boring bar is supported by a capped and bushed fixed rest at the front end of bench, by a slide in which it is held and centered at the rear end, and by two intermediate supports traveling with the slide at proportional rates of speed.

This rear end slide carries a gear wheel 30 inches in diameter, having 30 teeth, the axis of which coincides with that of the boring bar; this gear wheel is driven through a friction clutch from the square shaft for quick traverse in the main bed.

The boring bar is attached to this gear wheel and change gears are provided so that the boring bar can be rotated in the opposite direction to that of the gun and at any speed that may be desired, whereby the rate of boring is rendered independent of the turning.

The slide or driving head is provided with a fixed nut on a 5 inch feed screw in the boring bench. This screw receives both slow motion for feed and quick motion for bar traverse through a short gear shaft connecting it with the proper train of gears on the side of the boring bench.

All feeds provided in the tool carriage are given on the boring bench and in addition, by means of an extra back gear, each of these feeds can be divided by ten. In this way a much wider range of feeds is given for boring and screw cutting.

The changing gears are the same for both tool carriage and boring bench, any given arrangement of them producing the same feed in either case, with same back gear.

The boring bar carriers are provided with side extensions, upon which the bar can be rolled out of the axis of the lathe for the more convenient examination of the bores of guns.

The Garry Iron and Steel Roofing Company of Cleveland, Ohio, have made extensive preparations for the manufacture of graphite paint, believing that their success in the manufacture of iron ore paints assures them of a large demand for this class of goods. Graphite has steadily grown in favor as a paint. They guarantee this graphite paint to be the best and cheapest paint in the market. It is recommended particularly as a covering for iron and steel roofing at siding, smoke stacks, locomotive boilers, bridges, fences, wood or iron vessels, wagons, and all kinds of iron and wood construction work. They are prepared to furnish it in dry, mixed ready for use, and paste form, in any quantity. Samples and prices are furnished upon application.

The New York Tax Commissioners' assessment this year amounts to \$1,506,579,703, an increase of \$42,000,000 over 1891.

Transportation by Water in the United States.

The United States Census Office has just issued a bulletin giving statistics, showing the condition of the industry of transportation by water in the United States in all its branches, except that of canals, for the year ended December 31, 1889. The text and tables have been prepared by Thomas

portation fleet of the United States at the close of 1889 numbered 25,540 steamers, sailing vessels and unrigged craft, whose gross tonnage was 7,633,676 tons, and whose estimated commercial value stood at \$215,069,296. These figures of equipment, it may be stated, are not those given by the Commissioner of Navigation, owing to the fact that the commissioner includes in his report the fishing vessels, a fleet of nearly 7000, while the census does not take

Since 1881 the registration of barges and such other craft as have no motive power of their own has not been insisted on except in the infrequent case of those occupied in the carriage of bonded goods. The registration of barges, &c., having therefore largely become a matter of convenience and option, the records of the custom house contain but a very small proportion of the unrigged craft belonging to American owners, and the records of the

TABLE I.—EQUIPMENT.

Statement Showing Number, Tonnage and Value of all Steamers, Sailing Vessels and Unrigged Craft Registered in all the Ports of the United States on December 31, 1889, given by the Great Geographical Divisions.

Geographical divisions.	Totals.			Steam vessels.			Sailing vessels.			Unrigged.		
	Num-ber.	Long tons.	Value.	Num-ber.	Long tons.	Value.	Num-ber.	Long tons.	Value.	Num-ber.	Long tons.	Value.
Atlantic Coast.....	12,459	2,794,440	\$123,874,177	3,713	793,571	\$70,593,090	6,490	1,383,108	\$45,545,357	3,250	617,761	\$7,735,730
Gulf of Mexico.....	1,008	77,542	3,851,270	220	45,591	2,961,450	613	17,400	788,110	175	14,722	161,710
Pacific Coast.....	1,842	44,939	23,067,370	531	170,503	15,526,455	822	208,000	6,715,570	489	63,356	825,345
Great Lakes.....	2,784	925,365	48,941,474	1,489	599,949	41,193,344	987	187,000	4,275,650	308	139,400	3,472,800
Mississippi Valley.....	7,451	3,399,389	15,335,005	1,114	210,772	10,539,251				6,339	3,182,608	4,795,754
Totals.....	25,540	7,633,676	\$215,069,296	6,067	1,820,386	\$140,813,570	8,912	1,795,440	\$57,324,487	10,561	4,017,847	\$16,931,039

J. Vivian, in charge of statistics of transportation, under the general direction of Prof. Henry C. Adams, expert special agent. This is the first census that has undertaken to gather, compile and publish full statistics concerning all classes of transportation by water, and the totals given in this bulletin are indications of the importance of the industry and the success made in reporting it.

The statistics given in the following tables, while they may be subject to some revision as the work of tabulation for the final report proceeds, can be accepted as showing with measurable exactness the condition of the industry of transportation by water in the United States, with the exception of that branch of it operating on canals. The proviso, too, must be well understood that the figures only relate to such craft as are of American ownership, and (with the exception of some of the unrigged) to such as are registered in the ports of the United States. In this presentation no comparison of data is attempted; only totals are dealt with, and only the operations of the year ended December 31, 1889, are given. The reasons for reporting on the year mentioned are that it was found impossible to secure reports for the fiscal year ended June 30, 1890, no such period of accounting being adopted in the principal centers of transportation, while in such important localities as the great lakes and the upper

cognizance of these as properly belonging to transportation by water as an industry, but regards them as forming an industry by themselves and entitled to a separate report thereon.

The total line of Table 2 presents some large figures, showing, as it does, that

census have been entirely made up from lists compiled from its own inquiries. An idea of the difference between the account of registered and unregistered barges may be gained from the statement that according to the statistics of the Commissioner of Navigation there were 1185 registered

TABLE III.—CREWS AND WAGES.

Statement Showing the Total Number of Persons of all Classes Employed to make up the Ordinary Crews of all Operating Vessels of the United States during the year ended December 31, 1889.

Geographical divisions.	Total all craft.		Steamers and unrigged.		Sailing vessels.	
	Number of employees.	Amount of wages paid.	Number of employees.	Amount of wages paid.	Number of employees.	Amount of wages paid.
Atlantic Coast....	654 8 9	\$18,862,199	23,174	\$10,358 436	31,635	\$8,503,773
Gulf of Mexico....	63,891	61,215,744	2,479	880,743	1,412	345,001
Pacific Coast.....	15,809	6,127,701	9,750	7,622,662	6,059	2,445,639
Great Lakes.....	15 881	5,322,799	11,309	3,821,604	4,572	1,431,108
Mississippi Valley.....	15,906	5,338,862	15,906	5,338,862		
Totals.....	106,436	\$36,867,305	62,708	\$24,151,694	43,728	\$14,715,611

a. Exclusive of pleasure craft on the Atlantic Coast and Gulf of Mexico.

during the year ended December 31, 1889, the freight movement by the whole operating American mercantile fleet amounted to no less than 172,110,423 tons of all commodities.

TABLE II.—FREIGHT TRAFFIC.

Statement Showing the Freight Movement in tons by all classes of United States Commercial Craft operating during the year ended December 31, 1889.

Geographical Divisions.	Total all craft.	By steamers	By sailing vessels.	On unrigged craft.
Atlantic Coast.....	77,597,626	28,778,341	38,383,401	10,535,884
Gulf of Mexico.....	2 864,356	1,455,450	1,408,526	49,380
Pacific Coast.....	8,818,663	5,741,940	2,761,226	314,597
Great Lakes.....	53 424,432	20,181,483	19,302 949	13,940,000
Mississippi Valley.....	29,405,046	10,345,504		19,059,542
Totals.....	172,110,423	66,502,718	61,707,702	43,900,003

waters of the Mississippi Valley the period of accounting is the season of navigability, bounded by the formation and breaking up of the ice, and to have waited until the close of the navigation season of 1890 would too seriously have delayed the work of securing returns.

The main fact of Table 1 naturally lies in the total, which shows that the trans-

The statistics of crews and wages given in Table 3 show that the number of persons of all classes employed to make up the ordinary crews of all the operating vessels of the United States, exclusive of pleasure craft, on the Atlantic Coast and Gulf of Mexico, during 1889 numbered 106,436, and that the total amount paid in wages was no less than \$36,867,305.

barges to be found in all the customs districts of the United States, while, as the census table in question shows, there were 10,561 of such barges in operation in 1889, and even the excess of 9376 by no means covers the existing number of craft of this description. The tonnage of these 10,561 barges was the exceedingly large one of 4,017,847, while the importance of this contingent to the American mercantile fleet is shown by its value, which has been estimated at no less than \$16,931,039. The record of the freight carried by the unrigged was not an easy matter to secure, and it was found a particularly difficult task to separate the accounts of freight actually carried on unrigged craft from the comprehensive reports of the steamers furnishing the motive power by which transportation was effected. The figures in this third table, therefore, cannot be accepted as absolutely full, but at the same time the 43,900,003 tons given as the amount of freight moved on these unrigged craft must not be considered as an estimate, but as an actual account for so far as the investigation has gone.

Governor Flower has vetoed the bill appropriating \$540,000 for improving and increasing the lockage capacity of the State canals.

WORLD'S FAIR NOTES.

Worked in the Rain.

Only three working days smiled on Jackson Park last week and the average progress in the work was correspondingly small. Although the rainfall has been tremendous, the drainage on the sandy site is good, and the weather occasioned but little inconvenience.

The strike of the iron workers on the Manufactures Building was broken Tuesday, and the work of erecting the big trusses was begun on that afternoon. The number of days the strike continued does not represent the same number of days lost on the work, for during the strike, although the contractors had no lofters or climbers, the 40 men remaining framed up trusses, drove pile foundations for the traveler and did much other work that will expedite erection in the future. The week closes with no labor troubles of any sort in sight.

The attendance of visitors during the week was light, because of bad weather. The order prohibiting visitors in carriages from entering the grounds has also had a tendency to decrease the attendance. Sunday's admissions were 8109, the biggest day since the admission fee system was inaugurated.

The Railroad on the Grounds.

Surveyors have located the route for an elevated structure of neat design and the trains will be run by electric power. The Western Dummy Company are putting up the road. The $5\frac{1}{2}$ miles of structure, with cars and other equipments, will cost from \$450,000 to \$600,000, and after the exposition the entire structure must come down. The company have agreed to pay the World's Fair directors 25 per cent. of the gross receipts from the time the first car is put on until the gates are locked.

The Western Dummy Company are controlled by the Thomson-Houston Electric Company. This electric elevated railroad has contracted to carry as many passengers as the attendance at the exposition may require. It will run cars at frequent intervals and collect a small fare, perhaps 5 cents. The road starts from a point on the lake shore at the extreme south end of Jackson Park, follows a circuitous route between the main buildings until it reaches the west line of the grounds and then runs due north to the State buildings. Here it sweeps over toward the lake shore and runs down to a point almost opposite Fifty-ninth street. It will be a double-track structure.

There were a large number of bidders for this franchise, as it was popularly supposed to be one of the most profitable concessions the directors had to grant. Everything in the way of elevated roads, from cars that run on one wheel to a moving sidewalk, was offered. The Western Dummy Company will finish the line as soon as possible. The projectors are anxious to get it up in time for the ceremonies of dedicating the exposition buildings next October.

Transportation Affairs.

The Columbian Passenger Committee, which represents all the railroads and attends to the World's Fair business, has decided upon a passenger rate of one and one-third fares during the exposition within a radius of 350 miles of Chicago, and of one fare for the round trip outside the circle of that radius. The rates, it should be remembered, are not fixed finally by this action, for the Columbian Passenger Committee can only recom-

mend to the railroads or traffic associations. The rates will be suggested to the roads by the committee and with them the decision will lie.

Excursions to Chicago this year promise to become quite popular. The Erie announces the first of the season for May 19. It will start at Pomeroy, Ohio, at a \$7.65 round-trip rate, including entrance to Jackson Park. The rate from Columbus, Ohio, will be \$5. This is about 1 cent a mile. The Alton also will inaugurate a series of excursions about June 1, and other lines will pursue the same policy.

William A. Smith, chief of the Transportation Exhibits Department, was granted permission by the Executive Committee to go to Europe in the interest of his department. In addition to work connected with his department, Chief Smith will probably devote some time to conferring with steamship managers about special rates for exposition passengers.

Engineering News.

Visitors to Machinery Hall will be enabled to pass from one end of the building to the other at an elevation, and thus gain a bird's-eye view of the vast area of exhibits, and to see many of the larger exhibits to much greater advantage than will be possible from the floor. To accomplish this three mammoth electric traveling cranes will be constructed, each with a lifting and carrying capacity of 40,000 pounds. Contracts for their construction have been let to the Yale & Towne Mfg. Company of Stamford, Conn., the Morgan Engineering Company of Alliance, Ohio, and the Edgemoor Bridge Works of Wilmington, Del. Previous to the opening of the exhibition these cranes will be used for the moving of heavy exhibits; afterward they will be covered with broad platforms capable of carrying several hundred people at each trip to and fro in the building.

Nahum Barnett, an architect of Melbourne, has under consideration a movement to arrange for a visit of a party of Australian artisans to the Chicago Exposition. The selection will be made from young workingmen, probably those in the last year of their apprenticeship, and it is considered that the inspection of the new modes of building adopted in the large cities of the United States, and of new inventions in connection with the science of building, will prove of immense advantage to the men, who will be able to impart the knowledge they gain here to their fellow-workmen upon their return to Australia.

The Rensselaer Polytechnic Institute, Troy, N. Y., is preparing to make a notable exhibit at Chicago. It promises that it will greatly excel the one it made at the Paris Exposition, where the institute was awarded a grand prize. The exhibit will include maps of this country and of the world, upon which will be shown the bridges, railroads and other engineering works built from plans by the graduates of the institute or under their supervision.

Particulars of the recent visit of the Mechanical Engineers to the fair have been received. They were welcomed to the grounds in a very neat speech by Holbrook F. J. Porter, assistant mechanical engineer of the exposition, who also explained to them the leading features of the arrangement which had been adopted. Chief Allison of the Department of Manufactures also made an address.

Mining Notes.

The gold and silver and other mineral exhibits at the exposition will probably aggregate in value several million dollars. In exhibits of this description Colorado will naturally take front rank. It is announced that the gold and silver nuggets to be shown by that State alone are worth \$250,000. There has been made a splen-

did collection of native gold specimens from all the richest mining districts. A single collection, valued at \$60,000, has already been secured. This will be supplemented by the finest collections, secured as loan exhibits. The exhibit will be both technical and economic in its character, showing a scientific classification of the mineralogy of Colorado and a correct presentation of its geology. At the same time, a popular and massive display of ores, building stone, commercial clays and other mineral products will be made. Models, maps and diagrams will be employed to show the progress made in mining. These will be accompanied by historical data and reliable information regarding the product and formation of veins in the mining districts.

Executive Commissioner Farquhar of the Pennsylvania World's Fair Commission will endeavor to make arrangements for the oil exhibit at the fair which the National Commission had refused because of danger from such a display. The oil men of the State have expressed a willingness to contribute \$30,000 toward the erection of a special building for this purpose on some part of the grounds yet to be selected. The proposed building will be fire proof, circular in form and about 300 feet in diameter. It is to be lighted from a glass roof and the whole structure will be divided into departments, where the separate processes of oil refining, &c., can be shown. It will be several stories high, all the floors of which will be reached by a spiral stairway. In the various departments will be exhibits of all the mineral specimens of the State, which are to be carefully preserved and returned. They will form the nucleus of a valuable permanent mineral museum to be established by Pennsylvania. The collection, which will be returned from Chicago, it is thought will be worth \$100,000. Mr. Farquhar is confident that his suggestions will be adopted, and the National Commissioners will remove all objections to the exhibit as proposed. The oil exhibit is to be in glass jars. The various processes through which oil passes from its production at the wells to its finished, rectified, clarified state will be illustrated by using some material that is absolutely free from danger of fire or explosion.

R. M. Haseltine, Chief Inspector of Mines of Ohio, has assumed the responsibility of making Ohio's mineral exhibit at the fair. Mr. Haseltine has had the matter under advisement for some time, and formally accepted the undertaking at the hands of the board last Saturday. He is now considering the plan of making the exhibit and the amount of space required. The variety of nature's treasures deposited in the State is very great, and to give each a creditable showing is quite an undertaking. Mr. Haseltine would be glad if those engaged in the production of minerals throughout the State would correspond with him in regard to the size and character of the samples they desire to furnish.

More Plans for Towers.

So many proposed tower schemes have fallen through that it seems almost a waste of space to allude to any more. It is announced now that the Ways and Means Committee of the fair has decided to erect three observation towers, each 300 feet high, as the 1000 foot tower seems to have been completely abandoned by its projectors. The assertion is made that they will not be ordinary steel and iron frames, but beautifully ornamental structures modeled after towers found in Italy and other portions of Southern Europe. Their exterior will look more like temples than anything else, for about the interior frame work will be constructed a wooden exterior covered with staff of ornamental designs, so that

the towers will harmonize in beauty and other general effects with the big buildings. They will be placed in different parts of the grounds where the best views can be obtained.

Telephone Service.

A telephone exchange having, it is now thought, about 600 instruments, will be established in the exposition grounds. Of this number about 25 will be toll telephones, which will be distributed conveniently about the grounds to be used by any one upon payment of a small fee. Some 300 will be for exclusive use by the exposition officials and employees, and the remainder will be for commercial purposes. The exposition will furnish space and other accommodations for the requirements of the Telephone Company for office and service, and the company will put in the instruments free of cost. It is the intention of the Telephone Company to establish at the exposition the best exchange in the world. Only the most perfect instruments and metallic circuits will be used. The long distance copper lines to New York will be completed by the time the fair opens, and connections will be made directly with this line at Jackson Park, independent of the Chicago exchange. Thus it is expected that through long distance telephones exhibitors will be enabled to talk to New York, Boston or Philadelphia without difficulty.

More State Buildings.

The New Jersey commission is considering 15 designs for the State Building to be erected. Three State departments will make distinct exhibitions, the State Geologist, the State Superintendent of Schools and the State Agriculturist. The most interesting exhibit will be that of the public schools of New Jersey. The schools made a creditable showing at the Centennial Exhibition in Philadelphia, and also at the New Orleans Exhibition. It is intended to improve on these exhibits by showing more work by the kindergartens and the pupils who have been under manual training. State Geologist Smock wants \$7500 to make a display of the ores, soils and minerals of the State. He proposes to spend \$5000 in this way and \$2500 in having made a large relief map of New Jersey.

Bids were opened at Detroit on the 11th inst. for the construction of the Michigan Building at the World's Fair. Six bids were received, and C. H. Pelton & Co. of Grand Rapids were awarded the contract for \$20,392.

Financial.

The fifth and final assessment of 20 per cent. on exposition stock subscriptions, about \$1,100,000, will be called this week in pursuance of a resolution adopted by the Executive Committee. So far the assessments have been paid with a very small percentage of delinquencies. Over 91 per cent. of the first three calls have been paid in, and over 60 per cent. of the April call has already been collected.

Comptroller May has agreed to pay over the last \$1,000,000 of the city's \$5,000,000 subscription June 15, and Treasurer Seeberger says these payments will carry on construction work until October. The treasury has \$2,500,000 in bank now, so that the available assets and money in immediate prospect amount to more than \$4,500,000. With expenses amounting to over \$1,000,000 a month, however, the directors think it best to call in all the reserve, and be prepared to meet the emergency that would arise should Congress fail to appropriate the money asked by the exposition.

Total collections so far have been \$8,196,680.15 and disbursements, \$5,761,885.71.

The bill introduced in Congress provides for an appropriation of 10,000,000 silver half dollars of special design, to commemorate the occasion, to be full legal tenders, which are to be paid over to the fair authorities to help carry out the undertaking, also \$700,000 for the Columbian Commission, \$200,000 for expenses of the Commission's meetings, salaries, &c., \$125,000 for the Board of Lady Managers, and \$25,000 to cover a deficiency for the present year, making in all \$6,050,000. It is pointed out that the special coins will be preserved by visitors as souvenirs and will probably not be presented for redemption by the Government. At the close of the exposition, however, the National Treasury is to be reimbursed on an equal footing with exposition stockholders and the city of Chicago.

Incandescent Electric Lighting.

A fight is still in progress over the electrical lighting of the grounds. Six weeks ago bids were asked for 92,000 incandescent lamps. The Edison General Electric Company offered to supply them at \$13 per lamp. The South Side Machine Company, managed by a Mr. Lockstaedt, agreed to furnish the lamps at \$5.45 each. Then Westinghouse went in with Lockstaedt, and new bids were asked. The Edison folks got the contract at \$5.95 per lamp. Lockstaedt and Westinghouse protested and bids were again asked. Westinghouse then filed a bond of \$500,000, and put up \$5000 as a guarantee that his company would go lower than the Edison people. Bids were opened Monday, and it was found that the Westinghouse bid was \$81,000 below the Edison bid.

There are three kinds of currents—alternating, direct and combination. The Edison can put in any of them, while the Westinghouse, it seems, can supply only the alternating. Chief Burnham recommended the acceptance of the Westinghouse bid.

Who the Owners Are.—As the President has signed the bill providing for the American registry of the City of Paris and the City of New York of the Inman line, it is of interest to know who holds the stock in these two steamers. An exchange states that Charles Lockart of the Standard Oil Company of Pittsburgh holds \$1,000,000 worth of the stock; the William Thaw estate of the same city a similar amount, and Charles J. Clark, also of Pittsburgh, \$500,000 worth, or a total of \$2,500,000. The two vessels named are sister ships, of the same size, and each worth \$1,500,000. From this it will be seen that Pittsburgh capitalists hold stock amounting to five-sixths of the combined value of the two vessels. The other principal stockholders of the International Navigation Company, which corporation controls the Inman line, are Frank Thomson, Charles E. Pugh and A. J. Cassatt of the Pennsylvania Railroad Company; John D. Rockefeller of the Standard Oil Company; Peter Wright & Sons of Philadelphia, and Mr. Griscom, president of the company.

The report of the Building Inspector of Pittsburgh for the first quarter of this year has just been completed. It shows the building business to have fully recovered from the prostration caused by the strikes of last year, and it further shows a state of building enterprise which almost equals the very flourishing report of 1890.

It was rumored that the Burlington and their connections are cutting rates on agricultural implements to St. Paul, Omaha, &c. At this time agricultural implements are the biggest single item of west-bound traffic.

The Cast-Iron Pipe Trade.

At a meeting of the Board of Trade of Reading, Pa., on the 11th inst., the following paper was read by Peter D. Wanner:

The use of cast-iron pipes grew out of the wants of water works about the beginning of the present century. There were 16 of these works in the country prior to the year 1800, and 87 in the year 1850. Up to this point of time the pipe trade had developed slowly and was not regarded as of much importance. After 1850, however, the large and rapid increase of water and gas works made the demand for pipe proportionately large, giving new life and vigor to the industry. About this time the Mellerts began the manufacture of cast iron pipe in this city. The panic of 1857, as well as the civil war, retarded the trade very considerably. During the war only a few works of either gas or water were constructed, and it was not until after 1865 that the business in this line again commenced to improve, and increased to such an extent that even the panic of the seventies did not appear to affect it until the year 1878. Owing probably to an overbuilding of water and gas works, and the high price of pig iron then ruling, the trade remained quiet until the summer of 1881, when it became very active, and remained large and profitable until the end of 1887. These were six years of unprecedented prosperity for the pipe manufacturers of this country, but with them disappeared the profits of the trade.

With net earnings for 1887 away up among the thousands, we had to be contented at the winding up of the following year with a few hundred dollars. Since then the best possible management was required to hold what had been previously accumulated and meet current charges, and should we take into account the wear and tear of machinery and fixtures, necessary repairs and improvements that should have been made, but were postponed excepting only cases of absolute necessity, it would be entirely safe to say that no money has been made.

If any pipe foundry can show a better record I should like to hear from them, and yet during all this time the demand for pipe was large and the number of water and gas works were increased to an aggregate of 2200 for water and 1200 for gas, having a mileage of probably not less than 50,000, or twice around the world.

The trade was also increased of late years by a demand from railroads, &c., for sewer, drainage and culvert purposes, but owing to the great number of new pipe foundries constructed throughout the South and West, and the increased capacity of the older ones, the demand fell short of the supply. In other words, we have had overproduction, plain and simple.

All the new foundries built since the boom of the eighties could well have been spared and the money saved to the investors, but men learn by experience only. The present condition is full of anxiety and has brought about some very desperate movements, particularly on the part of Southern establishments—i. e., the pipe works at Bessemer, Ala., made strenuous efforts during the past year to secure a portion of the Northern trade, to which we have to add the Radford Pipe Works of Radford, Va., for this season, which has secured a large number of orders, among them for Boston, Lowell, Albany, Philadelphia and other points. I regard the movement of the latter as too full of assurance and of unprecedented boldness; if they can fill their orders successfully in the face of the rigid inspection required by these cities, then there will be no longer any art in pipe making, without reference to profit.

View the situation as we may, it clearly means that this once prosperous and profitable trade will become uncertain and of doubtful tenure, and that location, equipment and management will be the essential elements tributary to the success of pipe foundries in the future, North and South. It is, in my opinion, however, absurd for this or other iron industries in the South, no matter what their financial strength may be, to presume that they can either obtain or hold any great portion of this trade. It is true they have closed up a number of furnaces and pipe foundries throughout the North, of which many will never run again, yet there are others which will meet every cut in price and remain in the trade. Having cut to cost and below, their next move must necessarily be on wages as a last resort, and the inevitable.

Thus this abnormal stimulation of the pipe and iron industries, beyond the wants of the South and of the country at large, is bringing discomfort and ruin to many once happy homes throughout the North.

Some will plead, no doubt, for this Southern competition, that it results in cheap iron, pipe, &c., but when that can be reached only by the sacrifice or closing of our own works, or by a severe reduction of wages, we fail to see how it will promote either the interest, wealth or happiness of our people.

So far as the cast-iron pipe trade of the future is concerned, I believe that each particular section will have its own works, or rather its own particular territory, to which their trade will become necessarily confined, and even in that event each section will, probably, have to abandon some of its present works.

The Quicksilver Trade.—The receipts of quicksilver at San Francisco for April and for the first four months of the year were as follows:

	April.	January 1 to April 30.
1890, flasks.....	912	4,276
1891.....	1,035	4,604
1892.....	1,856	5,766

The exports by sea for April were 385 flasks, valued at \$15,817, including 358 flasks to Mexico, 20 to New Zealand and 7 to Central America. The shipments by sea for the first four months of the year were as follows:

	Flasks.	Value.
New York.....	2,100	\$90,300
Australia.....	387	14,672
New Zealand.....	20	820
Central America.....	39	1,537
Mexico.....	1,015	38,840
British Columbia.....	200	7,800

Total.....3,761 \$153,969
In 1891.....1,079 51,366

There were 733 flasks sent overland in March, and 2000 flasks by the same route for the first three months of the year. The report of overland freight for April has not been made public.

An event of much interest to Chicago was the arrival last week of 20 locomotives for the South Side Elevated Railroad. They are compound engines, of 28 tons each, and were built by the Baldwin Locomotive Works of Philadelphia. Their transfer to the tracks on which they will hereafter run was accomplished very neatly. At the east side of the elevated road a track with a very sharp ascent was built on heavy supporting timbers, and with a donkey engine and wire ropes the engines were easily moved up the incline and were then switched on the tracks. The passenger coaches are being received also, and the road will be in operation by the 1st prox. The introduction of elevated railroads in Chicago has so long been in course of preparation that the actual opening of one for business will be a notable occurrence in local history.

Pittsburgh Building Troubles.

At Pittsburgh last week 64 members of the Builders' Exchange of that city were served with notice that application will be made to the courts for a preliminary injunction against them on allegations made in a bill in equity served upon them at the same time. The bill states that the defendants, as individuals or as members of the Pittsburgh Builders' Exchange, have unlawfully conspired and colluded and combined together to not sell any builders' supplies or any other material to any of the said plaintiffs in the business of the building contract they have on hand, or which they might contract to carry on in the future, and by threats and menaces and by divers acts of intimidation and by force prevented the plaintiffs either as individuals or otherwise from carrying on their business as contractors, journeymen or apprentices, and have also prevented such of the plaintiffs as are contractors from purchasing or obtaining in any way within the county of Allegheny, brick, sand, lime or any other building materials useful or necessary in the carrying on of their business, and have by their unlawful confederacy and conspiracy prevented the plaintiffs from carrying on their work, or from purchasing and obtaining such material in their business, and are now actively engaged in menace, threats or intimidation and by force, in preventing the plaintiffs from engaging in or contracting for work, or of completing buildings they now have on hand or under way or in process of completion, and have wholly prevented them carrying on their business and earning a livelihood.

This move on the part of builders and contractors who are not members of the Pittsburgh Builders' Exchange has been caused principally by the fact that the contract for a large clothing house to be built in Pittsburgh has been let to a firm which is not a member of the Pittsburgh Builders' Exchange. There was considerable competition to secure this contract, and it is understood that the firm who are putting up the building in order to cater to and secure the trade of the working classes made an exception in favor of the firm not identified with the Builders' Exchange. Carrying out the tactics employed last summer during the continuance of the strike at Pittsburgh, members of the Builders' Exchange in that city will endeavor to prevent the firm who have the contract for the erection of this building from obtaining supplies to be used in the construction of it. The outcome of the suit as noted above will be watched with considerable interest.

Maryland Shipbuilding.

The statement is published that a steel bark is to be built in Maryland for Boston capitalists. The interest of this announcement lies in the fact that the vessel will be the first of the kind ever owned in Boston. The contract for her construction has been given to the Maryland Steel Company at Sparrow's Point, who draw their material from iron mines in Cuba and have a complete shipbuilding plant, the iron and steel being wholly manufactured on the company's premises. The Boston ship is intended for the China trade. She is to be a handsome clipper bark, 220 feet long, 39 feet extreme beam, 24 feet depth of hold, and of a tonnage of 1500 net. She will have a full poop with wheelhouse way aft and a charthouse just abaft the mainmast. Forward, on the spar deck, there will be a commodious house containing the galley, stores and quarters for the crew. Quarters to accommodate four boys are also provided here entirely separate from the crew, a provision which the designer believes will encourage American

parents to send their boys to sea. In the cabin there will be an ample saloon, a large captain's cabin on the starboard side, and a large guests' cabin on the port side aft, three spare staterooms with set bowls, the first officer's room, two bathrooms, the pantry, and steward's stores. Forward a steam engine will be placed to assist in heaving in the anchors, in moving cargo, and to aid in handling the ship generally.

San Francisco News.

SAN FRANCISCO, May 2, 1892.

Not many years ago the nail trade of San Francisco was almost entirely one of importation of Eastern nails, and that chiefly around Cape Horn. Our nail trade by rail was never very large. By sea it had at one time attained considerable dimensions, the annual importation reaching 229,749 kegs. This was in 1875. It has never been so large since. By rail the trade has never been of much magnitude, as on account of the low values of nails they could bear no great freight, and the roads found more profitable tonnage than nails would be at a low figure. By degrees, too, the clipper freight became higher, the railroads coming to an understanding with ship owners, and this gave an opportunity to some local capitalists to start the Pacific Iron and Nail Company. With lower iron and comparatively high freights it became possible to start the business under favorable auspices, and most of our merchants began to favor the home made article. There was, of course, competition, but the local factory managers kept just inside the limits, and their goods went off like hot cakes. Month after month their output increased, while the importations steadily declined in volume. So it happened that we only got 134,000 kegs of Eastern nails in 1884, 99,957 kegs in 1886 and only 77,414 kegs in 1887. This was ebb tide, for the next year there was an increase in imports, which in 1890 again reached 98,791 kegs. Of course all this time the consumption of the coast was on the increase. The distribution from San Francisco, which was only 126,830 kegs in 1871, rose to nearly 300,000 kegs in 1884, and reached 397,730 kegs in 1889. The local company made as high as 360,000 kegs in a single year. And all went merry as a marriage bell. There were dividends, and workmen were paid good wages. But then competition began to show its head again, and prices were pushed down, and workmen were inclined to make trouble when there was a prospect of wages being cut down. There were 104,840 kegs imported in 1891, of which 40,100 kegs came by rail. At the same time the number of kegs manufactured locally declined from 360,000 a year to 300,000. Importations by rail have been light this year so far, but those by sea are large, every clipper recently bringing 3000 to 4000 kegs. The natural result of all this has been a steady reduction in price during these years—from \$5.50 in 1871 to \$3.75 in 1880, and so on till the last two years, since when the decline has been rapid. It has been continued into this year till bedrock, for the present at least, has been reached at \$2.25 during the past month. It may be observed that this price is not for local trade, \$2.40 being the lowest quotation for that. Our local nail factory is crowded to its utmost, but it is likely that Eastern competition will be considerably curtailed by this latest move.

The recent reduction of refined bar iron to \$2.35 per 100 pounds will also have the effect of curtailing Eastern shipments to this coast, at least to the extent of the capacity of the Pacific Rolling Mills and the Judson Iron Works. We imported 26,669 tons of scrap in 1891 and got about 20,000 tons from coast sources, or say a total of

40,000 tons for use in our foundries for mixing with pig and in the works already noted for the production of bar. With successful competition against the East this would be largely increased. Stress of circumstances has brought our manufacturers, or rather is steadily bringing them, to the conclusion that lower prices are a *sine qua non* of successful competition. It may also, in conjunction with other matters, lead to a revival of the attempt to successfully compete in pig iron production with, say, Alabama. Importations of tin plate still continue at a lively rate, and to judge from the statistics put forward, California and the Pacific Coast will have to depend for a good while yet on Great Britain for supplies of tin plate for their canned fruit and vegetables and for their salmon fisheries. The Osterspool, the other day, brought 38,408 boxes to hand, making the total to date 217,138 boxes, the largest five months' importations in a long series of years. The market is solidly down to \$5 87½ per box.

The daily capacity of the tin mines at Temescal will be doubled by the use of new machinery. The market remains firm at 23 cents.

The H. B. Hyde imported recently 498 tons of American pig iron, making in all 1590 tons of American pig this year.

Rail receipts continue free; for the past two weeks 68 cars, embracing 12 cars of agricultural implements, 6 of iron, 16 of machinery, 1 of castings, 1 of valves, 2 of cable, 3 of harvesters, 1 of safes, 5 of shovels, 3 of pipe, 2 of boilers, 3 of plates, 1 of stamped ware, 1 of plows, 1 of engine, 1 of wire, 2 of hardware, 2 of stoves, 1 of wire netting, 2 of beams, 1 of columns, 24,550 pounds of copper, 4 cases of tin plate and 230 kegs of nails.

Sensational Railroad Developments.

Disclosures have been made through the capture of correspondence found in possession of an alleged criminal in this city, that may have important results by making it evident that railroad and other transportation companies are habitually and recklessly violating the Interstate Commerce law by granting rebates and in other respects nullifying the law in its practical application. One of our contemporaries says: "The importance of the papers may be explained in very few words. Nearly all of them show beyond peradventure violations of the Interstate Commerce law. If convictions could be obtained by the United States District Attorney on every violation of the law established or indicated by the abstracted papers several of the railroads would be bankrupted by the fines involved. The Interstate Commerce law, as it stands at present, makes both the shipper who obtains an advantage and the railway man who grants it alike guilty and fixes an equal punishment for each. This, of course, makes the obtaining of direct testimony practically impossible, for every one with any connection with the matter under inquiry may shield himself behind the privilege which the Supreme Court has reiterated is the right of every witness, to refuse to answer any question where the evidence might tend to degrade or incriminate him."

The Caldwell Railroad, a short line running from Caldwell, N. J., to Great Notch, on the line of the New York and Greenwood Lake Railroad, has been bought by Abram S. Hewitt for the Greenwood Lake Company. The purchase was made at sheriff's sale and the price paid was \$4100. It cost \$85,000.

Architects are competing for the Manhattan Life Insurance Company's great building to be erected at Broadway and New street.

The Tennessee Coal, Iron and Railroad Company.

The annual report for the fiscal year ending January 31, 1892, has just been issued by President T. C. Platt of the Tennessee Coal, Iron and Railroad Company. The report begins with the statement that while the general depression in business has caused the company to realize lower prices for their products than in any previous year, it is gratifying at the same time to be able to state that while this is so, the profits of the business have not been disappointing, due to the fact of the larger output of both coal and iron than in any previous year of the company's history, and all produced at considerably lower cost. The gross profits for the fiscal year were \$692,069.96, while the gross profits for the preceding year were \$663,889.78, showing an increase in profits of \$28,180.18. With the same number of stacks as the previous year the company made 29,842 tons more pig iron, turning out in all 290,220 tons, which is the largest output in the company's history. The coal output was increased 195,711 tons, the aggregate being 1,776,881 tons, which is also the largest output of coal ever produced by the company. The quantity of coke made was 521,729 tons, which is 23,715 tons more than the product of the previous year, and is also the highest yet achieved. The capacity for output of both coal and pig iron during the year has been largely increased; that of the iron by improvements at some of the furnaces and that of coal by the opening of new and additional mines. The company's output of iron ore at the Inman mines was 117,160 tons.

Realizing that the low prices prevailing will necessitate economical production, the physical condition of the property has been greatly improved. In all the mines the dead work has been driven far ahead, the actual working of the main entries and crop entries and air courses being far ahead of the rooms. The expense of all this has been charged to the cost of coal, and at the Pratt mines this represents an outlay of over \$100,000.

Considering the very excellent physical condition of the property, the president says he has no hesitation in venturing the prediction that though this has been the best in the history of the company for economical production, next year will be an improvement on this in a lower cost of production of both coal and iron. Though the iron market has steadily declined during the year until it has reached prices never known in the history of the country, it is gratifying to be able to report that the company were never before in so good condition physically and financially.

The statement is made that the large quantity of pig iron being carried by the company has not been stored or hypothecated, but has remained, in all respects, as a working stock in the usual manner without a ton of it pledged for any liability or advance. With this accumulation of iron, which is ready for the market, and can be sold at any time when normal conditions return and the prices justify, the company are now in a position to commence the payment of dividends on the common stock whenever it may be deemed prudent to deplete the cash resources or to market the iron. The pig iron thus carried was valued at the date of the report at \$788,427.

The reports of the managers of the several departments are given in detail, but are too voluminous to give at any length. The cost of pig iron at Easley is stated to have been reduced considerably below that for any previous year, the item of labor alone having been lowered 57 cents from that of the year ending January 31, 1891. Repairs and renewals cost 5 cents

less. The only item of cost which has increased is coke, which figures 13 cents higher than for the previous year, which is attributed largely to the fact that in the last year two old furnaces were blowing in which the coke consumption was higher.

The report for the Tennessee department states that while the average selling price of pig iron for 1891 was \$2.16 per ton less than for 1888, the average cost per ton of the product for 1891 was \$2.06 per ton less than the average cost for 1888.

The report of the secretary and treasurer states that the operations of the past fiscal year show a gross profit of \$692,069.96, and after the payment of the interest on bonds and floating debt, premiums on bonds purchased for the sinking funds and dividends on the preferred stock, the balance remaining unappropriated is \$251,991.41, or about 2½ per cent. on the common stock. The balance brought forward from last year to the credit of this account was \$209,901.24, so that the total amount now standing to credit is \$461,892.65, but as within the two years \$279,001.21 of this amount has been used for capital expenditures and \$12,906.30 has been used in the reduction of the bonded debt, there is practically left in the business as an addition to the working capital the residue of \$169,985.14. The net bonded indebtedness at the time of the report was \$5,189,453.90. The capital stock was \$9,000,000 common and \$1,000,000 preferred, or \$10,000,000 in all.

Anti-Trust Proceedings.

The indictment found by the United States District Court Grand Jury in Chicago against the Whisky trust, better known as the Distilling and Cattle Feeding Company, was regarded as the beginning of proceedings which might end in a general onslaught against all alleged unlawful combinations of the kind. Therefore, when the indictment was quashed by Judge Nelson on the ground of its inefficiency, there was much surprise. Judge Nelson said:

"An indictment framed under the law should contain a distinct averment in the words of the statute, or in equivalent language, that, by means of the acts charged, the defendants had monopolized, or had combined, or conspired, to monopolize trade and commerce among the several States, or with foreign nations. This indictment contains no such averment. It does not charge that the defendants entered into any unlawful combination or conspiracy."

"Nor does it contain any averment that they had monopolized trade or commerce among the several States or with foreign nations. It avers merely that by means of the acts alleged, they had monopolized the manufacture and sale of distilled spirits, without stating that in so doing they had monopolized trade and commerce in distilled spirits among the several States or with foreign nations. It is true that the indictment charges that the defendants have done certain things with intent to monopolize the traffic in distilled spirits among the several States, and that they have increased the usual prices at which distilled spirits were sold in Massachusetts, and have prevented and counteracted the effect of full competition in such traffic in Massachusetts."

"But none of these things are singly made offences by the statute. The indictment in this particular is clearly insufficient according to the elementary rules of criminal pleading, and charges no sufficient offense within the letter or spirit of the second section of the statute."

A second indictment found against the same defendants is supposed to cover the defect existing in the first, from which cir-

cumstance the inference is naturally drawn that the design on the part of the authorities is to proceed with the utmost deliberation, leaving no loophole through which escape may be possible.

Mesaba Range Leases.

By leases closed during the past two weeks what has been styled the Kimberly syndicate obligates itself to mine on the Mesaba Range, north of Duluth, a minimum of about 1,000,000 tons of iron ore yearly. The Kimberly syndicate consists largely of the members of the Hamilton Ore Company, who have been carrying on mining operations near Iron Mountain, Mich., for years, P. L. Kimberly, the well-known iron manufacturer of Sharon, Pa., being the leading spirit. In addition to this party, J. R. Bearinger, also an old Michigan miner, is interested in some of the leases already made. The deal is a most important one, especially as it is the first actual recognition of the value of the Mesaba Range by miners of experience elsewhere, and as it foreshadows mining operations far larger than the minimum total of 1,000,000 tons a year. It also has already had an effect in hastening other deals of a like character which have been and are still under consideration. The facts as to the lease of the Biwabic Mine are as follows: P. L. Kimberly leases three 40-acre tracts of the Biwabic Mine, agreeing to mine 300,000 tons, minimum, for a period of 20 years, paying 50 cents a ton royalty. He agrees to mine out all the ore in sight in the three forties in the 20 years, and to take out half of it in the first ten years of the lease. J. R. Bearinger leases one forty, agreeing to mine 100,000 tons, minimum, for each of 20 years, and to mine one quarter of all ore in sight in the first five years. Both parties must begin shipping ore as soon as a railway reaches the property, which will be this fall. The Biwabic Mine has a traffic contract with the Duluth, Mesaba and Northern road, and the leases are made subject to this contract. Fee holders of the land on which the Biwabic is located get a royalty from the mining company of 25 and 20 cents a ton, so that the stockholders of the mine will get 25 and 20 cents a ton on a minimum output of 400,000 tons per annum. By the terms of the lease the entire mine must be cleaned out in 20 years; the Biwabic stockholders believe that almost double the minimum quantity of ore must be shipped annually.

Leases of the Kanawha and Cincinnati mines were to be ratified by stockholders on the 13th and 14th inst. respectively. Both are to P. L. Kimberly. The former is for a minimum output of 100,000 tons a year on a royalty reported to be 80 cents a ton; the latter is for a minimum of 400,000 tons a year at 50 cents a ton. These leases are in most respects like those of the Biwabic, except that advance royalties are to be paid by Mr. Kimberly on the ratification of the deals by the stockholders. On the Kanawha, which is stocked for \$2,000,000, the advance royalty is \$38,000; on the Cincinnati, stocked for \$3,000,000, the advance is \$56,000. These advances are to be taken from the payments of the first years and are in no sense a bonus. It is believed that on the entire list of leases the amount to be mined cannot well be less than 2,000,000 tons a year.

The Cincinnati Mine has about \$2,800,000 of stock issued, which has sold as high as 25 per cent., but is now quoted at 19. The advance royalty will pay 2 per cent. on this at par, and the minimum royalty of \$130,000 a year will give the stock dividends of about 16 per cent. on the highest price so far paid for it. The Kanawha has issued about \$1,900,000 worth of stock, which has never been above 15

per cent. The advance royalty pays 2 per cent. on the par value. Both these properties are leaseholds, the fee owners getting 25 to 30 cents a ton royalty. Fees of all the properties mentioned are largely owned in Duluth, except for a half interest in the Biwabic belonging to a Chicago lumberman. The Kimberly syndicate has also made two contracts for leases, one for a 40 acre tract of the Shaw Iron Company, on which it expects to strike rich ore by comparatively deep mining, and the other for two forties of the Rouchelleau. All these mines and prospects are located in the northeast part of township 58, range 16, 48 miles from Duluth. Negotiations are pending for leases of several other mining properties in the same region. The Hale is soon to be leased, with others, while the Mountain Iron, Mesaba Mountain and others will be operated by the owners.

James P. Witherow Company.

(By Telegraph.)

The Jas. P. Witherow Company of Pittsburgh has made application for a charter of incorporation for the purpose of carrying on a general engineering and contracting business, with offices at Pittsburgh and works at New Castle, Pa. This new company will succeed to the business of Jas. P. Witherow, who made an assignment last year, and whose affairs have since been in the hands of Alexander Thomas of Pittsburgh, assignee. It is probable that the capital stock of the new concern will be \$500,000, one-half being preferred stock, held by the principal creditors, and the other half being common stock, to be held by James P. Witherow and others. It is expected that as soon as the details pertaining to the organization of the new concern have been effected, the works at New Castle, which have been idle since the assignment of Mr. Witherow, will be put in operation.

The Pittsburgh Iron and Steel Engineering Company, Lewis Block, Pittsburgh, Pa., have closed a contract with the Raney & Berger Iron Company, New Castle, Pa., for the erection of three Cowper hot blast stoves 11 x 65 feet in size. This is a new type of stove recently designed by the first-named firm. We are advised that satisfactory progress is being made looking to the establishment of a Bessemer steel plant at Youngstown, Ohio. It is understood that the capital stock has been placed at \$500,000, one half of which, it is said, has already been subscribed. The intention is, if present plans are carried through, to erect a plant containing two 5-ton vessels and the most modern machinery. It is expected that definite information concerning this new project will be forthcoming in a short time.

The Illinois Steel Company have brought suit against the Pittsburgh Wire Company for infringement on rod mill patents. They ask for \$50,000 damages. The case was started in the United States Circuit Court at Chicago, on the 13th. The patent that is alleged to be infringed on is known as the "Garrett rod mill." Most of the modern rod mills in the country have been built under this patent, but the different manufacturers had to purchase licenses from the Illinois Steel Company.

Trade Publications.

THE NEWTON MACHINE TOOL WORKS of Philadelphia have issued a catalogue describing the general line of machine tools built by them, including slotters, drills, gear cutters, milling machines, cold saw cutting-off machines, &c.

THE CATALOGUE published by Wilson, Whiteley & Co. of Springfield, Ohio, not only describes the knives, sickles, cutting apparatus and special parts and extras for harvesting machinery made by them, but also contains many engravings of the different departments. It is stated that this plant is the largest in the country, and is equipped with machinery especially designed and made for use in their particular line.

THE PROPERTIES of aluminum and its alloys are very fully treated in a small pamphlet by the Cowles Electric Smelting and Aluminum Company of Lockport, N. Y. We find directions for working the metal, annealing, melting and casting, drop forging, &c., and the mechanical characteristics of the various alloys.

WE HAVE RECEIVED from T. F. Welch & Co. of Boston, Mass., a circular describing the improved hand-turning tools, steel saw arbors, knurls or milling wheels, brass racks, gears, &c., made by them. They have lately begun the manufacture of an improved face plate chuck designed for holding odd-shaped pieces which require to be faced up true with the hole. It is, of course, equally well adapted for holding round or square work.

THE TRENTON IRON COMPANY of Trenton, N. J., have issued a new price-list of wire rope and wire-rope fittings. This price-list begins with a description of the composition of wire rope, giving the uses to which rope of various strands and composition are specially adapted. It also gives directions how to handle wire rope in order to keep it in good condition. The prices cover pliable hoisting rope, transmission or standing rope, ropes of high tensile strength, galvanized wire rope, iron tiller rope, sash cord, galvanized strand for guys, signal cord, &c., galvanized steel cables for suspension bridges, galvanized cast-steel wire hawsers, patent locked wire rope, railroad switch and locking ropes, turn buckles, loop sockets, open sockets and other wire-rope fittings. The company also furnish iron hoisting wheels from 3 to 5 feet in diameter, wood-lined hoisting wheels, wheels for transmission of power by wire rope, iron sheaves for elevators and derricks, &c. They are also manufacturers of bar iron, rods, wire rods, iron and steel wire, piano wire, box springs, spring wire, steel wire, bale ties, &c., and are builders of suspension bridges, passenger and freight elevators, wire-rope tramways, wire-rope haulage plants, &c.

THE FALCON IRON AND NAIL COMPANY of Niles, Ohio, manufacturers of steel and iron sheet, black and galvanized iron, also skelp iron, have issued a very handsome souvenir consisting of colored views of the principal buildings of the World's Fair at Chicago. Each building is lithographed on a separate sheet and the leaves are bound together with a silk ribbon. The company have also issued a revised price-list of their galvanized iron, arranged in very convenient form, giving net prices for the various discounts running from 62½ to 75 and 5.

Duty Assessed on Moist Ores.—The United States Supreme Court on Monday rendered its judgment in the case of John W. Earnshaw against John Cadawalader, Collector of the Port of Philadelphia. The Collector won this case in the lower court and also wins in the Supreme Court. The case arose under the tariff act of 1883, and the point involved was whether duty should be assessed on an importation of iron ore according to the number of pounds reported by the United States weigher, as weighed at the side of the vessel when the cargo was discharged, or on the weight when the moisture naturally contained in it was dried out. The Collector assessed duty according to weight at the vessel's side, and Justice Blatchford announced that the Court held that to be the correct method.

THE WEEK.

Only two bids were received for new gun forgings for 6 and 8 inch breech-loading rifles, one from the Bethlehem and the other from the Midvale Steel Works in Pennsylvania.

The Vanderbilt interest being strongly represented in the new management of the Delaware and Hudson Company is supposed to give an assurance that the control of the property will not pass into hands foreign to the State.

The proposed Union Station to be erected at Boston will be at least 1000 feet in length, with arched iron roofs on the central and lateral divisions, making quite an ornate structure.

A contest which has arisen between the Granite Manufacturers' Association of New England and workmen employed by them threatens to involve in trouble all who are using granite either as a building material or paving streets through a large part of the country. A prominent member of the association says: "The granite manufacturers and large quarry owners realize that they are face to face with the most important contest into which they have ever been forced. This question as to whether quarry owners have the right to say when and for how long they shall sign agreements with their employees is a vital one, and on its favorable decision depend the great interests of the trade in the entire country." The two sides seem equally resolute in the positions taken.

The export trade in cotton goods is practically at a standstill. The demand from China is dead, the effects of the Chinese bill. It is expected that Chinese merchants will retaliate and will buy goods of countries that are more favorable to their people. Trade with South America is very quiet, and there is but little doing with Africa. The export mills are still busy, however, on previous orders.

The St. Clair Tunnel is so filled with gas and smoke that the Grand Trunk Railway have difficulty in finding engineers to operate the road, but relief will be sought by attaching smoke consumers to the locomotives.

A Duluth paper says a new railway, built for the express purpose of hauling the ore from Lake, Cook and adjacent counties, has been projected. This ore can be shipped to Port Arthur, loaded on vessels and shipped by the great lakes to Buffalo, Cleveland and other distributing points.

A long standing cause of irritation between the United States and Canada is removed by an act of the Dominion Government just adopted, which provides that United States vessels and wrecking appliances may render aid and assistance to any vessels and property wrecked, disabled or in distress in waters of Canada contiguous to the United States.

The Argentine Republic is shipping more hides and cattle this year than ever before.

The officers of the Inman Line steamships will renounce their allegiance to the Queen rather than lose their position when the flag is changed.

Elegant gifts of silver plate from the Czar of Russia have been received for the commanders of the two American steamers that took cargoes of grain for the relief of the sufferers from famine.

The Argentine Government has bought a cruiser from Armstrong. It is of 5000 tons and has a speed of 23 knots. The

price is £295,000 sterling. The armament is included.

Referring to the proposed transfer of the Inman steamers to the American flag, the *St. James' Gazette* says that hereafter when an Admiralty subvention is granted it should be clogged with the condition that the vessel earning it is not to be transferred to a foreign flag on any condition whatever.

Canadian exports to Great Britain during the last four months increased 76 per cent., compared with the corresponding months last year, showing the effects of restricted traffic with the United States.

The expansion of the British mercantile marine is remarkable. During the last decade the production of new vessels in Great Britain exceeded 7,500,000 tons, and the tonnage of goods carried outward and inward, estimated at 53,000,000 tons in 1880, grew to 76,500,000 tons in 1890. The entrances and clearances grew from 133,000,000 tons in 1880 to 164,000,000 tons in 1890. As by far the larger part of the traffic carried on through the Suez Canal is transacted by vessels sailing under the British flag, the gain in tonnage passing through the waterway from 3,000,000 in 1880 to nearly 7,000,000 in 1890 is distinctively a British gain.

The British Government decides that it will not assent to the commercial convention between the United States and Newfoundland.

Petroleum in bulk will be transported through the Suez Canal on July 1.

T. Jefferson Coolidge is confirmed as United States Minister to France.

The Canadian Pacific Railway is successful beyond expectations, as shown by the annual report just made. The main line has been in operation five years, and, with its auxiliaries and branches, earned in the past 12 months the large sum of \$20,241,000. The surplus last year, after paying fixed charges, was \$3,315,000, and it now has a reserve surplus fund of \$4,701,000. The road interests people in the United States chiefly because it is a sharp competitor for Asiatic trade.

The officers of the American bark, Samuel B. Hale, just arrived at Philadelphia from Santos, the principal coffee center in Brazil, tell gruesome tales of the ravages of yellow fever at that port. Lying in harbor waiting to discharge or load are nearly a thousand vessels whose crews are thinned out by the disease. On some the entire crew have died. For nearly eight months the Hale was unable to unload her cargo owing to the large number of vessels in harbor awaiting their turn to discharge. This was slow work, as but four vessels are able to get alongside the wharf at one time, and to unload the large fleet in port when the Hale left will take a couple of years.

The total valuation of Buffalo this year is \$167,192,080, an increase of over \$17,000,000 over last year.

Coffee growing in Mexico is having an important development.

The National Brotherhood of Boiler Makers, in session at Columbus, Ohio, last week, adjourned on Friday, the 13th inst., to meet the second Monday of May, 1893, at Topeka, Kan. The election of officers resulted as follows: Grand president, J. J. McCarty of Indianapolis; first vice grand president, Leo Johnson of Topeka, Kan.; second vice-president, R. F. Allen of Pocatello, Idaho; third vice-president J. F. Madden of Charleston, S. C.; financial secretary and treasurer, Ramon Garcia, Atlanta, Ga. A resolution was adopted providing that in cities and towns requiring a boiler inspector and where

said inspectors now occupying these positions were known to be incompetent and not practical boiler makers, the N. B. of B. M. demand that a law be enacted to require said inspectors to be practical boiler makers. A resolution was also adopted indorsing the system of binding apprentices, so that both the employers and journeymen boiler makers are responsible. The convention declared in favor of the opening of the World's Fair grounds on Sundays, to give workingmen an opportunity to attend.

The American pension list now approaches 1,000,000 names and absorbs a sufficient amount of money to make a decided impression upon the contents of the United States Treasury.

The ripening crops in central New Zealand have been destroyed by a disastrous hurricane.

A plate-glass trust is talked of at Pittsburgh.

Many Western manufacturing establishments have been compelled to close owing to floods on the rivers.

The River and Harbor bill reported to the Senate carries appropriations amounting to \$22,470,118, exclusive of the contracts, which will bring the amount up to \$50,000,000. The net increase over the House bill is \$1,123,143.

The exports of mineral oils from the United States during April are reported at 65,851,000 gallons, compared with 50,985,000 for April, 1891, bringing the total for ten months up to 593,159,000 gallons, or within 5,000,000 gallons of the export of a corresponding period of last year. With anything like a corresponding gain during May and June, the petroleum exports of the 12 months will be greater than those of the previous fiscal year or any other except 1890, when they were 693,000,000 gallons.

The new steamship Colombia, for the Pacific Mail Steamship Company, has been finished at the Delaware River Iron Shipbuilding and Engine Works, at Chester, and will immediately go into service. She is 346 feet length over all, 326 feet length molded, 45 feet beam and 26½ feet depth of hold. The engines are triple expansion, with cylinders 28, 44 and 70 inches diameter by 48 inches stroke. The boilers are six in number, 12 feet diameter by 11 feet 7 inches long, for a working pressure of 160 pounds, and she is expected to develop a speed of over 15 knots an hour, which will place her in the third class of steamers, in conformity with the Postal Subsidy bill.

Wm. H. Webb's Asylum for Superannuated Shipbuilders and Academy for the Education of Novices in the Art will be in operation a year hence. It is endowed with \$1,000,000.

The mammoth structure to be known as the Postal Telegraph Building, to stand on the corner of Broadway and Murray street, opposite City Hall Park, will be 13 stories high and will cost \$750,000.

The proposed cotton press combine at New Orleans is a failure.

We have received the third annual report of the City Statistician of the city of Superior, Wis. This is quite a remarkable publication to be issued under the auspices of a city government. It gives a great deal of very valuable information regarding the business of Superior, its commerce, its manufacturing interests and the advantages of location possessed for all classes of industry at that point. The publication abounds with interesting views connected with the development of the resources of that section.

The Iron Age

New York, Thursday, May 19, 1892.

DAVID WILLIAMS, - - - PUBLISHER AND PROPRIETOR.
CHAS. KIRCHHOFF, - - - EDITOR.
GEO. W. COPE, - - - ASSOCIATE EDITOR, CHICAGO.
RICHARD R. WILLIAMS, - - - HARDWARE EDITOR.
JOHN S. KING, - - - BUSINESS MANAGER.

Iron and Steel Statistics.

The following summary of the production of iron and steel in this country has just been issued by the American Iron and Steel Association:

Articles.	Tons of 2000 pounds.		
	1891.	1890.	1889.
Pig iron, including			
spiegel.....	9,273,455	10,307,028	8,516,079
spiegeleisen.....	143,098	149,162	85,823
Pessemer ingots.....	3,037,107	4,131,535	3,281,879
Bessemer rails.....	1,442,319	2,061,978	1,691,261
Open-hearth ingots.....	649,323	574,820	419,488
Crucible ingots.....	81,297	79,716	84,909
Iron and steel rods.....	601,000	511,951	407,513
Rolled iron and steel, except rails.....	4,573,841	4,634,076	4,160,401

A comparison of the production of these three years is of much interest. The pig iron and Bessemer steel figures had previously been published, but the others are fresh. The falling off in the output of 1891, as compared with 1890, was not uniform throughout this list. In steel rails the heaviest decline is noted, reaching 31 per cent. Bessemer ingots came next, with a reduction of 12 per cent. Pig iron fell off 10 per cent. In spiegeleisen the decline was but 4 per cent., while the figures for all kinds of rolled iron and steel except rails showed a reduction of but 1 per cent. On the other hand, open-hearth steel ingots made a gain of 13 per cent. and crucible steel ingots increased slightly. The steady growth of the open-hearth steel output under the adverse conditions of the past year is remarkable. Looking back to 1889, it will be found that quite a jump has been made, the figures for 1891 showing an advance of nearly 50 per cent. in this branch. More open-hearth steel works are under construction, so that this growth promises to continue. The course of the steel trade of Great Britain thus seems to be repeating itself on this side of the Atlantic. Wire rods also show a good increase, amounting to 17 per cent. on the make of 1890. The rod trade is now a very important section of our domestic industry.

The comparisons made above are with 1890, when great activity prevailed. If 1889 is taken as a basis of computation, it will be found that the production of iron and steel in 1891 shows up quite well. As compared with that year the output of pig iron was 9 per cent. larger, Bessemer ingots 10 per cent., spiegeleisen 67 per cent., all kinds of rolled iron and steel 10 per cent., and rods 47 per cent., while Bessemer steel rails alone fell 14 per cent. short. It was therefore by no means a poor year, statistically considered. The expansion of productive facilities, however, as shown by the volume of business attained in 1890, was so much beyond the requirements of

the trade in 1891 that the result was a poor year financially.

Interesting figures are presented for nails. Those who are familiar with the course of the nail trade in 1891 would not be surprised to learn that the output of that year was below 1890. They may be surprised when told that 1891 was the year of largest production ever known in the nail business. There was, of course, a reduction in cut nails, but in wire nails the gain on the previous year was so heavy that the loss on cut nails was more than offset. The figures are as follows for the past three years:

	Kegs of 100 pounds.		
	1891.	1890.	1889.
Iron and steel cut nails.....	5,002,176	5,040,946	5,810,758
Wire nails.....	4,114,385	3,335,911	2,435,000
Total.....	9,116,561	8,376,857	8,245,758

The production of cut nails in 1891 decreased 11 per cent. as compared with 1890, and 12 per cent. with 1889. On the other hand, wire nails gained 31 per cent. on 1890 and 69 per cent. on 1889. An other year will very probably bring them up to if not ahead of cut nails. The total output of all kinds of nails shows an increase of 4 per cent. on 1890 and 16 per cent. on 1889.

The most important deduction to be made from the above statistics is that the consumptive requirements of this country are considerably in excess of the production of any year previous to 1890. Even the depression of 1891, which was regarded as quite severe in iron circles, did not very seriously cut down the aggregate volume of business.

Reduced Local Freight Rates.

The manufacturers of Eastern Pennsylvania and New Jersey are gratified at the action of the railroad companies in reducing freight rates on raw materials. The reduction of 10 per cent. may only mean a fraction of a dollar on the total cost of moving the materials entering into a ton of pig iron, perhaps 25 to 40 cents. But at a time like this, when manufacturers are doing their utmost to cut off every cent of expense that can be avoided, even the small saving in freights is a welcome boon. To a concern manufacturing 400 tons of pig iron per day, a saving of only 25 cents per ton means \$100 daily to the good. This reduction in freight rates is in harmony with the universal leveling of prices, and is an acknowledgment by the railroad companies that they accept the conditions prevailing in general business, and are willing to share to some extent in the unpleasant results of depressed trade. The cut is not great enough to enable the local manufacturers to secure absolute control of their natural markets, but it will assist them to maintain their foothold, and perhaps retrieve some of the ground won from them by Southern competitors.

In this connection the point obtrudes itself for recognition that the Reading combination has been effective in bringing about the reduction. The organization of this huge aggregation of interests has

brought into the field a competitor which the Pennsylvania system is obliged to regard with much greater respect than was ever accorded to the individual companies of the combination when they were operated on their own account. Possible encroachments on each other's prerogatives will hereafter be very closely watched by both these great corporations, and the interests of the manufacturers located in their territory are likely to be more assiduously fostered. Their jealousy of each other crops out in the rival claims made as to which was first to inaugurate this recent reduction in freights. Both wish to make as much capital out of it as possible. They know that it is a movement which will be highly appreciated by the manufacturers, and would like to have full credit for it. Taking this view of the question, the formation of the Reading combination would seem to be productive of benefits to the manufacturing interests in the section covered. There are now two very powerful organizations in the field, each endeavoring to win the favor of the Eastern manufacturers.

Standard Methods of Testing Locomotives.

The increasing use of compound locomotives in this country has stimulated locomotive tests to such an extent that more engines were tested last year than in the previous five. The pressing need for uniform methods of testing is forcibly shown by the fact that the greater economy of the compound locomotive over the simple has not yet been shown in such a way as to convince many who demand accurate tests upon which to base their conclusions. The preliminary report of the committee appointed by the American Society of Mechanical Engineers to consider the question of a standard method of conducting locomotive tests would seem, therefore, to be particularly timely. This report is to be presented at the San Francisco meeting, now in session.

It is recommended that the tests be made with a special train when possible, as this will insure uniformity in the weight of the train, another advantage being that the speed can be varied, as the train is not compelled to run on scheduled time. It is sometimes desirable to ascertain the amount of coal used during a specified part of the run; this can be accomplished by putting the coal in sacks containing 125 pounds each, and dumping it upon the foot plate as needed. This admits of estimating the rate of consumption on difficult portions of the run. The use of water meters and of coal in sacks renders unnecessary the weighing of the tender, and thereby removes one of the most important sources of inaccuracy. A most essential and at the same time very difficult work is the measurement of the fire line before and after testing. In long runs these errors may not be of much moment, but "for short runs there seems to be no way of measuring the difference between

the heat value of coal in the fire before the test and after with sufficient accuracy to give reliable data." The height of the coal should be gauged by two or more assistants engaged in the trial, and at the end of the run the fire should be as nearly as possible in the same condition.

The indicator is used to determine the power of the engine, the action of the valve gear or the coal and water used per unit of power in a unit of time. It should be attached to a three-way cock at the outer edge of the steam chest, so that the $\frac{3}{4}$ inch connecting pipes can go directly to holes tapped in the sides of the cylinder rather than in the heads. In this arrangement the pipes are shorter than if they passed over the chest into the heads, and draining is facilitated, as the horizontal portions are short. The indicator should be piped so that it will draw a diagram of the steam chest. The indicator gear may be a true pantograph motion, either fixed or adjustable in height; or it may be a simple pendulum connected to the crosshead by a link with a wooden quadrant 2 inches thick, and having a radius to produce a card 3 inches long. The diagrams should be taken at equal distances, rather than at equal intervals of time. Located near the observer should be a revolution counter, so designed as to always begin at zero and record the revolutions for exactly one minute, and then stop.

Before beginning the tests the boiler should be cleaned on both sides of the heating surface and these surfaces kept clean by frequent washing during the test. The capacity of the boiler for generating steam is to be measured by the number of British Thermal Units taken up every hour by the water and steam in the boiler; this to be determined from the temperature of the feed water, pounds of water evaporated per hour and the steam pressure, by using any good set of steam tables. The pyrometer for measuring the temperature of the smoke box gases should be placed near enough to the flues to get the average temperature of the gases before they mix with the exhaust steam and after they have passed the heating surface. Full directions are given in the report for supervising and conducting the coal tests.

The power necessary to move the train, or the pull upon the draw bar, can be registered upon a strip of paper moving at a definite rate per mile traveled by the train. The speed is to be found by a chronometer provided with an electric circuit-breaking device, which should be very carefully made to produce exact intervals of time marks. The Boyer speed indicator is pronounced accurate and reliable when it is properly mounted and cared for.

The throttling calorimeter, when the bulb of the thermometer is in direct contact with the steam flowing through the instrument, will answer every purpose by indicating the occurrence of excessive priming, which is a sudden temporary action causing water to mix with the steam to such an extent that no quantitative measurement of its amount is practicable. The calorimeter should draw steam from the dome and from the pipe

carrying steam to the cylinder in order to determine fully the performance of the boiler as a generator of dry steam.

We have endeavored in the foregoing to give merely an outline of some of the most important points of the report, which is preliminary and subject to revision. The committee state that as the American Association of Railway Master Mechanics have appointed a like committee it would seem advisable to invite joint action and report, thus securing uniformity in the method proposed.

Net Income of Workingmen.

Abstracts appear in the daily press of a report just completed by Carroll D. Wright, Commissioner of Labor, on wages and the cost of living in certain industries of the United States and European countries. The report itself is not yet ready for general distribution. From the details thus far published we take the following table, showing the average income and cost of living per family in the cotton, woolen and glass industries:

	Cottons.	Woolens.	Glass.
United States:			
Income.....	\$678	\$664	\$860
Expenditures....	611	394	769
Net income..	\$47	\$269	\$91
Great Britain:			
Income.....	\$556	\$516	\$502
Expenditures....	502	492	460
Net income..	\$54	\$34	\$42
Germany:			
Income.....	\$302	\$276	....
Expenditures....	283	282	....
Net income..	\$19	*\$6	....
* Deficiency.			
France:			
Income.....	\$366	\$424	....
Expenditures....	334	384	....
Net income..	\$32	\$40	....
Switzerland:			
Income.....	\$358	....	....
Expenditures....	347	....	....
Net income..	\$11	....	....
Belgium:			
Income.....	.....	\$628	....
Expenditures....	.....	492	....
Net income.....	.....	136	....

There are several curious features about the above statement. The income per family in the United States is, of course, larger than in any other of the countries named, but the net income is not so great as is generally supposed to be the case. In the cotton industry Great Britain makes a better showing, while Germany and Switzerland are poor, indeed. The woolen industry presents more comforting facts for the United States, but here a question arises as to whether an error has not been committed in the figures for expenditures. They seem too low as compared with the figures for other industries. In the woolen trade the showing for Germany is bad, family expenses exceeding income. The Belgian glass workers would seem to be better off than their American fellow-craftsmen, but the latter are evidently more extravagant in their tastes. The only figures for pig iron and bar iron given relate to gross income. For pig iron these are as follows: United States, \$592; Great Britain, \$457; Belgium, \$375. For bar iron the income per

family is as follows: United States, \$784; Great Britain, \$520; France, \$465; Belgium, \$359; Germany, \$282.

Tables in the report show the percentage of the expenditures for different purposes based on an economic law published some years ago by Dr. Engel, late of the Royal Bureau of Statistics of Prussia. The tables of this American report fully substantiate Dr. Engel's distinct propositions, which were:

1. That the greater the income, the smaller the relative percentage of outlay for subsistence.
2. That the percentage of outlay for clothing is approximately the same, whatever the income.
3. That the percentage of outlay for lodging or rent, and for fuel and light, is invariably the same, whatever the income.
4. That as the income increases in amount, the percentage of outlay for "sundries" becomes greater.

Under Dr. Engel's statistics it was shown that in a family living on about \$500 a year the expenditures were: For subsistence, 55 per cent.; clothing, 18 per cent.; rent, 12 per cent.; fuel, 5 per cent., and sundry expenses, 10 per cent. Mr. Wright's tables show that taking all the normal families comprehended by the report and for all the industries considered in it, and that were living on an income of from \$500 to \$600 per annum, subsistence constituted 43.83 per cent.; clothing, 15.28 per cent.; rent, 15.14 per cent.; fuel, 5.63 per cent., and sundry purposes, 19.15 per cent.

A matter of some significance is the rapidly diminishing trade in importing steel billets for re-export in more finished forms. The price of domestic billets is now so low that manufacturers of wire products for export have turned to them. The cost, delivered at their works, is so nearly down to the cost of foreign billets with allowance for drawback on duty paid, that it is found undesirable to import billets and lock up the funds necessary to carry each transaction through to the final repayment of duties by the Government. The change which is here indicated is radical, and would not have been regarded as within the bounds of probability but a few months back. The commercial interests directly involved are perhaps not of great moment, but as an indication of the tendency of prices here to seek the level of those abroad it is well worthy of comment. It may be further stated that at quotations now current in England and the United States foreign Bessemer pig iron could not cross the Allegheny mountains if it were admitted free of duty.

The bursting of the fly wheel of the engine in Manchester, N. H., last fall, and the breaking of the shaft of the engine in Willimantic a few days since, appear to have aroused considerable anxiety on the part of mill owners in New England who are provided with large engines. We learn that many inspections

by competent engineers have been made of different plants, and that defects, in some instances dangerous, have been discovered. The interesting question is, will the warning given by the two accidents and facts made plain by the inspections lead to the improvement of engines pronounced weak in certain parts? We think it is doubtful, for the simple reason that one mill is not prone to learn when the object lesson is presented by its neighbor. But one result is reasonably certain—care will be exercised in designing new engines to make them of ample strength, and it is probable that the days of the massive cast-iron wheel, weighing many tons, 30 feet or over in diameter, and running at a phenomenal speed of a mile a minute and over, are numbered.

The Iron and Steel Institute.

The annual meeting of the institute will be held at the Institution of Civil Engineering, 25 Great George street, London, on Thursday and Friday, the 26th and 27th inst. The programme of arrangements, furnished by J. S. Jeans, secretary, is as follows:

THURSDAY.

9.30 a.m.—Meeting of council at 25 Great George street.

10.30.—General meeting of members. The council will present their report for the year 1891. The Hon. Treasurer, David Dale, will present the statement of accounts for the year 1891. Scrutineers will be appointed for the examination of the voting papers. The Bessemer medal for 1892 will be presented to Arthur Cooper. The president, Sir Frederick Abel, will deliver an address. The following papers will be read and discussed, as far as time permits:

"On Experiments with Basic Steel." By W. H. White, C.B., F.R.S., Director of Naval Construction and Assistant Controller of the Navy.

"On the Production of Pure Iron in the Basic Furnace." By Col. H. S. Dyer, Elswick Works, Newcastle-on-Tyne.

"On Experiments on the Elimination of Sulphur from Iron." By E. J. Ball, Ph.D., and A. Wingham, F.I.C., London.

"On Platinum Pyrometers." By H. L. Callendar, London.

FRIDAY.

The following papers will be read and discussed:

"On the Manufacture and Application of Chilled Cast Iron" (Gruenow's system). By E. Reimers, technical director of the Gruenow Works, Magdeburg.

"On Valves for Open-Hearth Furnaces." By J. W. Wailes, Calderbank, near Glasgow.

"On the Calorific Efficiency of the Puddling Furnace." By Major Cubillo, Trubia Arsenal, Spain.

"On a Practical Slide Rule for use in the Calculation of Blast-Furnace Charges." By A. Wingham, F.I.C., London.

"Notes on Fuel, and its Efficiency in Metallurgical Operations." By B. H. Thwaite, Liverpool.

Chief Engineer G. B. Cornell, who is at work on the plans for the new bridge across the East River between this city and Brooklyn, estimates the cost of the work at \$10,000,000. The piers will extend 280 feet above high water, and for 150 feet will be of granite. The rest will be constructed of steel girders.

CORRESPONDENCE.

The Wire Gauge.

To the Editor: I have felt an interest in the question of the wire gauge for over 20 years, using it more or less during that time in rolling mill practice, and as Mr. Oberlin Smith has suggested in your issue of the 5th inst., I would venture to state some views on the subject. The parties who formulated the scale to which he refers have undertaken to simplify the matter, and surely merit a more charitable recognition of their efforts than the first paragraph of his article indicates. I am of opinion that the Birmingham wire gauge is far away the best. That it has some divergencies from an accurate division or gradation is a recognized fact, and I do not think Oberlin Smith can so apportion a distribution of 1 inch by thousandths as to make a better practicable gauge. If he can, it would be interesting to see it elucidated in your columns, just as plainly as was the proposed "Congress gauge," if I may be permitted to so term it. Let us have a—Congress chisel. If all other gauges could be legislated out of existence but this B. W. G., or another equally as good, and one or the other adopted not only in America, but universally, then it would appear that every point essential would be attained. The confusion is almost wholly in their multiplicity. The Birmingham, or Partridge, gauge is mostly used for rolling mill purposes. It is best known, and it is a recognized appurtenance of rolling mill men. To compel them to relinquish those they have and to buy others would be an arbitrary tax, and one cannot but wonder what manufacturers propose to reap the benefits? Then arises the question as to who proposes to be credited with the origin of the future wire gauge? As it has been in innumerable other contrivances, so it appears that it is contemplated to appropriate all the original conditions which have been inherited, and have led up to this point, and coolly invest them into the proposed new gauge, whereas the difference is so infinitesimal as to justify one in applying the old adage to it of the rose smelling just as sweet by whatever name it may be designated. It is said Partridge, the original constructor, was a blacksmith, and by no means an educated man, but his gradation of the different thicknesses was so well proportioned as to be accepted generally as the best, and it has held the leading position for very many years. The difference between one size and another size is not uniform; thus the margin between No. 7 and 8 is not the same as that between No. 9 and 10, and $\frac{1}{2}$ inch is midway between No. 10 and 11 wire gauge, and this peculiarity exists throughout the whole series of sizes, and it is in this incident (that is, of the difference between one gauge and another being different in a gradual degree throughout) that a grading by thousandths would become an intensely greater nuisance than the present standard, for if $\frac{1}{2}$ -inch should be the maximum size, as Mr. Smith seems to indicate, then there would have to be 500 different sizes down to $\frac{1}{16000}$ or the smallest size. Neither does it appear that such minute divisions are in any respect essential; in fact, it would be just one other case of too many irons in the fire. It is very likely that it would be a perplexing undertaking to demonstrate what relation one sixty-fourth is to be one thousand part of an inch? In fact, two different premises or principles confront us right here—the one is the division of the English foot rule by two, four or six, while the other is by fifths and tenths or the decimal system; they conflict and become even numbers for a postulate and uneven num-

bers for its definition. In this connection it has long appeared to my mind that America did well to adopt the decimal system for weights, as 100 pounds equals 1 hundredweight, and as a basis for monetary affairs, but why not have gone on to the logical and legitimate issue and also have continued it into measures is beyond my comprehension, so that to adjust the wire gauge into thousandths it would first be desirable to have a Congressional scale of measurement.

There is another point I may allude to as applicable to the larger sizes, and that is, what is commonly termed a hot gauge is brought into existence—which is an enlarged size of each number to cover shrinkage which takes place between a plate gauged hot and its contracted dimensions when cold. How this contingency may be covered in the thousandth style is another minute problem.

I have no hobby to grind in this, except that I believe uniformity to be the great and probably the only desideratum. The Birmingham wire gauge covers the entire requirements. The exception proves the rule. I shall be glad to know of a solution of the nature of the survival of the fittest, even by Congressional enforcement, or by Mr. Smith's thousandths, but the former seems so near to plagiarism as to have little originality; and the latter, in order to be satisfactory, necessitates a metric mode of measurement through and through.

I am yours truly,

JOSEPH PARKES.

WEST SUPERIOR, WIS., May 9, 1892.

PITTSBURGH, PA., May 10, 1892.

To the Editor: We notice Mr. Smith's remarks in your issue of the 5th inst., who seems more angry, perhaps, than reasonable or convincing. However, we won't scold Mr. S., because we are very liberal in our views, and considering how little we know when compared with men with whom we come in contact in business relations, we hail with pleasure every new idea of a subject calculated to promote the good of all. We are individually convinced that the present system of working by gauges as they now stand is neither characteristic of America's inventive genius and originality, nor is it in harmony with the common sense rules of mechanical dispatch and accuracy.

We don't know really what need there is for a gauge for any thickness above $\frac{1}{2}$ inch. We are satisfied that the decimals of an inch specified—say by sixty-fourths of an inch to all thicknesses above $\frac{1}{2}$ inch—would be sufficient for all practical purposes; and such specifications given, if necessary, with the weight per lineal or square foot, would, we think, cover all requirements in the mercantile world. But apart from the trouble of a multiplicity of gauges is the serious expense incurred to no practical purpose whatever. For instance, a mill rolling steel plates does not need a gauge with more than 30 sizes in it which it never uses. Neither does a sheet mill rolling from No. 10 down to No. 36 gauge need to pay the expense for one which has about three dozen sizes in it which are of no service to it whatever, and, in fact, what our friend Mr. S. would call a "cumbersome nuisance." Then all we would have left to accomplish is to make one universal system of distinguishing sizes from $\frac{1}{2}$ inch and less by thousandths of an inch; and, while this is extremely simple in a gauge constructed similar in form to the present, yet, in comparison to the demands for material which would be governed by sixty-fourths of an inch and thicker (to which the thousandths of an inch would be indeed very small in proportion), such a gauge would, nevertheless, be standard and should be made legal.

We are aware of the fact that there are in some few instances demands for material

thicker than $\frac{1}{8}$ inch requiring great accuracy. Mill spindles, for instance, for which Norton's gauge is used, and by which such material is ordered in England. Nevertheless, what we want is an American standard of measurement—one of our own, independent of England or any other country; one which shall be based on sound common-sense business principles and recognized as the American standard for all purposes, and be legal in all contracts or demands in the mercantile industries. For the sake of individuality and character for mechanical and mercantile ability and skill, let us have some one system of universal measurement, and quit this monkey business of aping some other country. Let us be original, at least, and especially when from the present chaos of unintelligible multiplicity we can earn a name that shall be honored by all civilized nations for redeeming manufacturers and workmen from the verge of idiocy by the too close application of dissecting gauges.

Yours respectfully,
BEN CATLEY.

Iron Ore in New Mexico.

The report comes from Chicago that negotiations have just been closed which, it is said, will open up a new iron field, the extent and wealth of which has never been reckoned by steel manufacturers. Fifteen million tons of rich iron ore of Bessemer quality are said to be in sight, and work has already begun on the development of the property, which will include railways and possibly smelting works to be owned by the company. The ore so described lies in the so called Hanover Valley of New Mexico, about 50 miles from Silver City and 150 miles from El Paso, Texas. The men by whom the purchase was made are said to be Horace Brock, one of the owners of the celebrated Cornwall iron mines near Lebanon, Pa.; A. Lanfer Norrie, of the great Norrie Mine; William Harriman of New York City, of Harriman & Co., bankers; L. W. Barringer, a Philadelphia millionaire; William H. Simpson of Boston; Fred. Crocker, vice-president of the Southern Pacific Railroad, and the present head of the celebrated Crocker family of the coast; Heber R. Bishop of New York, a director of the Rock Island Railroad; John Brockman of El Paso, a director of the Atchison, Topeka and Santa Fé; Isaac F. Adams of the firm of Adams & Hamilton, Chicago. L. W. Barringer of Philadelphia is named as the man who has been most active in carrying out the deal, the deposit having been discovered by his brother, D. L. Barringer, a geological expert.

PERSONAL.

George E. Merchant, president of the Rochester and Pittsburgh Coal and Iron Company of Rochester, N. Y., has been appointed assistant to President Yates of the Buffalo, Rochester and Pittsburgh Railroad Company, for all the roads in the system.

Ex-Superintendent John Male of the Albany Iron Works, Troy, N. Y., has returned from a two months' sojourn in England.

Secretary Col. William Y. Rice of the Consolidated Car Heating Company, Albany, N. Y., has returned from an extended European tour.

Chas. M. Schwab, superintendent of the Edgar Thomson Steel Works, at Bessemer, Pa., accompanied by his wife, will sail for Europe June 1. Mr. Schwab expects to be absent about three months and will combine business with pleasure.

Washington News.

(From Our Regular Correspondent.)

WASHINGTON, D. C., May 17, 1892.

Senator Carlisle, representing the minority of the Senate Committee on Finance, has had a conference with the majority in reference to their plans respecting the free wool and binding twine bills which have been sent over from the House. Senator Sherman, speaking for himself, but somewhat reflecting the views of his colleagues of the majority, said that it was not the present purpose to consider those measures, nor to act upon them during the present session of Congress. This determination, he added, would apply to the other tentative measures which were contemplated by the Committee on Ways and Means.

This purpose of the Committee on Finance was communicated to the Committee on Ways and Means, but it will have no effect in deterring them from going on with their piecemeal attacks upon the protective tariff system. They claim that the lines will be drawn more sharply in the campaign by this course of the Senate majority. One of the national issues which will be fought over being tariff for revenue only, and reform on that line, against tariff for protection, the passage of such measures by the House, and the failure to even report and discuss them by the Senate, will, they assert, answer the purpose quite as well as if the Senate should vote them down.

Representative Andrews of Massachusetts, who might be considered as reflecting the wishes of a formidable sentiment in New England, has been having submitted several propositions affecting the duties on certain classes of iron and urging their adoption by the Committee on Ways and Means. The reductions contemplated in his bill are:

Structural iron, duty seven-tenths of 1 cent a pound.
Railway bars of iron or steel, four-tenths of 1 cent a pound.
Cast-iron pipes of all kinds, seven-tenths of 1 cent a pound.
Pig iron, 20 per cent. ad valorem. His original proposition was to reduce this to 5 per cent., but even the committee could not stand such a radical cut.

The attempt to interfere with the duties on certain grades of iron will lead to some interesting developments, as the States of Alabama, Georgia, the Virginias and Tennessee are not ready to start in on a free-trade crusade against iron and iron ore, at a time when their own vast supplies of ores and iron products are becoming important factors in the iron and steel markets of the country.

Chairman Springer, in conversation, expressed himself as not wholly satisfied with the shape his tentative tariff reform policy was taking. His idea originally was to confine himself only to certain articles of common demand among large classes of the population, like free wool for the manufacturers of New England; free cotton ties for the cotton growers of the South; free binding twine for the grain growers of the Northwest; free iron ore and coal for the iron manufacturers of the seaboard and interior, and free sugar, free salt, and even free lumber for the people at large. The chairman was not anxious at this time to embark in too many articles, which would have the appearance of a determination to suddenly make a general reduction or repeal of the tariff. As soon as the appropriation bills which are ready are out of the way the House will take a turn at the tariff reform measures which the Committee on Ways and Means have agreed upon for report.

There is a disposition on the part of the Senate to allow the minority of the House

to make up the record on the majority attacks on the tariff for campaign purposes.

The report of Carroll D. Wright, Commissioner of Labor, concerning the cost of living and wages in various countries as compared with the United States, has created a sensation in economic circles of more than national scope. The representatives of foreign governments resident here are manifesting their anxiety to receive early printed copies of the entire text. The press abstracts have evidently reached the capitals of the greater nations, as the eagerness of their authorities to examine them is shown in inquiries after information through regular official channels. The comparison between cost of production, statistics of wages or incomes and cost of living, together with the cost of certain enjoyments and indulgences, presents some valuable data bearing upon economic laws in the United States, Great Britain, France, Germany, Belgium and Switzerland.

OBITUARY.

JOEL G. GARRITSON.

Joel G. Garrison died May 2, at the home of his brother, Oliver S. Garrison, president of the Buffalo School Furniture Company, in Buffalo, N. Y. The cause of his demise was pneumonia, superinduced by the grip. He was born in Pickaway County, Ohio, March 1, 1841. In 1848 he moved to Iowa and in 1866 went to Buffalo, which he made his home up to the time of his death. In 1869 he went into business with his brother Oliver as manufacturers of builders' hardware, at the corner of Miami and Chicago streets. From there they removed to Henry street, and in 1875 their business developed into the Buffalo Hardware Company, who established themselves at the corner of Swan and Jefferson streets. Out of this came the Buffalo School Furniture Company. Mr. Garrison was interested in this as well as in large lumber mills which they conducted at Austin, Pa., under the style of the Buffalo Hardware Company. He was also interested in mines in Mexico. He took an active part in the company's business, his part of it being the management of the foundry department at the corner of Jefferson and Swan streets. He was a man of high character and devoted to his business. He was a member of the A. O. U. W., the Royal Arcanum, the Good Templars and the Microscopical Club. Two brothers and a sister survive him.

A circular issued by E. Van Hoegaerden & Co. of Antwerp, under date of May 1, states that a new syndicate of Belgian manufacturers has been decided upon, and they say this is certain to have a beneficial effect upon the price of iron generally, alluding, of course, to Belgian iron. A rise is therefore daily expected. Evidently the syndicate will embrace the manufacturers of bars, angles, plates, sheets and beams. This announcement shows that the manufacturers of other countries than the United States are able to make combinations to affect prices.

The large plant of the St. Louis Steel Foundry Company, located at East St. Louis, Ill., was destroyed by fire on the 17th. The conflagration was a severe one, and it was only found possible to save the boiler house and the patterns. The loss will aggregate \$75,000, and is partly covered by insurance. The company will rebuild at once, with an entire new equipment of machinery. Their specialty was the manufacture of steel castings by the basic open-hearth process.

MANUFACTURING.

Iron and Steel.

Last week the plant of the Pittsburgh Tin Plate Works, located at Kensington, Pa., manufacturers of Kensington roofing plates, was entirely destroyed by fire. It is understood that the firm will at once rebuild on a larger scale than before.

We have already made mention in these columns of the organization of the Aliquippa Tin Plate Company, who propose to build a tin-plate plant at Aliquippa, Pa., about 10 miles from Pittsburgh. Last week application for a charter for the new concern was made, the incorporators being Jas. P. Bailey, Chas. H. Low, Harry W. Low, Bartholomew Donovan and Wm. J. Shaw.

The business of the Midvale Steel Company, Nicetown, Philadelphia, is an ever-increasing quantity. Contracts for \$2,000,000 worth of supplies for the army and navy are now in their hands, of which the military department require the value of \$1,250,000 in guns, gun carriages and projectiles, the remaining \$750,000 being for the supply of gun forgings, castings, &c., for the navy. The guns ordered are of different pattern from the ordnance departments of both services, and range from 12-inch caliber down to the smallest pieces. The new machine shop, destined exclusively for gun work, will be completed this month. It is of fine proportions, having a measure of 260 x 2,0 feet, with a height of 53 feet clear under the runway of the traveling crane, so that the heaviest ordnance can be handled. The plant for manufacturing the new Holtz armor-piercing projectiles is also very nearly complete, and is expected to be in working order inside six weeks. The Holtz shell is of French invention, and is now in use by most European governments. It has now been decided to adopt these shells in this country, and the Midvale Steel Company, who have the sole right of their manufacture in the United States, have a very large contract for supplying them to the army and navy. They will be made to fit all the existing guns from 1½-inch to 16-inch caliber. Besides the above additions to the works, a new casting plant for steel castings is in process of construction, which will contain two 25-ton furnaces; also a new oil tempering plant, which will be able to temper the largest guns ever likely to be built. It is also in contemplation to erect, within a few months, a complete plant for the manufacture of armor plates. The works are, as they have been for the past four years without cessation, running full on double turn. More than 1000 hands are at present employed but their number will probably be increased by at least 50 per cent. when all the new branches are in operation.

The largely increased demand from the new tin-plate makers in this country for black sheets of American manufacture has induced the American Sheet Iron Company of Phillipsburg, N. J., to tear down one of their three rolling mills in order to erect in its place an English, or "light-iron" mill for the purpose of making fine sheets suitable for tinning. Workmen are now busily engaged preparing for the placing of the new plant, the three pairs of rolls for which are being manufactured by the A. Garrison Company of Pittsburgh, and it is expected that they will be ready for operation by July 1. The rolls will be worked by a 300 horse-power Corliss engine, having a 25-ton driving wheel, 30 feet in dimension. With the English mill the company expect to be able to turn out sheets up to 36 gauge, and to produce double the quantity which can now be rolled by each of their American mills. The American Sheet Iron Company have hitherto made a specialty of light-iron sheets up to 28 gauge, their brand, American RG, being well and favorably known to the trade. A new annealing furnace is also being built, which will be an effective addition to the company's plant.

The report that the mills of the Ohio Iron Company, manufacturers of pig iron, bar iron and steel at Zanesville, Ohio, which have been idle for some time on account of a strike of the men, would be started up with non-union men is entirely without foundation. The firm have not set any time for the resumption of work in their mills and will not make any effort to resume operations until there is a change for the better in the price of iron.

The Norton Iron Works of Ashland, Ky., manufacturers of nails and spikes, have recently placed in their plant a battery of Babcock & Wilcox boilers.

Steps have been taken at St. Louis which are expected to lead to the rehabilitation of the St. Louis Ore and Steel Company, who have been in trouble for several years, because of a big debt. The Vulcan Mill and Pilot Knob property of the company were sold by order of

the court to a committee representing the bondholders for \$115,000. Mr. Hitchcock and Oliver Garrison of the bondholders have gone to New York to arrange with the trustees for the bondholders for a release of the property, and if possible a settlement of the entire matter, which involves a bonded indebtedness of \$2,600,000. The plants have not been in operation for several years.

The Ironton Structural Steel Company of Duluth, Minn., have let a contract to the Marinette Iron Works Company for all the machinery and castings needed for their new open-hearth plant and rolling mill. The contract includes two pair of rolling-mill engines, each engine 36 and 48 inch cylinders, roll frames, several thousand tons of general casting, smaller engines and the like. Plans for the entire work are not yet turned in, but it is believed it will amount to considerably over \$100,000.

The West End Rolling Mill Company of Lebanon, Pa., state that they are quite busy in all their departments. Some seven years ago they ceased to make the ordinary coil chain, and devoted their entire capacity to making high grade chains. Their trade has steadily grown, and they have been repeatedly compelled to enlarge their chain department. Their product goes principally to crane builders, dredging companies, shipyards and marine railways. During the past season alone they have fitted out with chain cables over 50 new vessels on the New England coast, and at present have large orders for New England, San Francisco and New Orleans. They have also filled a number of export orders for Germany and Panama.

Forty double tenpenny nail machines are being put in the plant of the New Castle Wire Nail Company, at New Castle, Pa. Improvements recently made will bring the capacity of the plant up to 3000 kegs per day before July 1.

M. V. B. Chase of Augusta, Maine, has been appointed receiver of the Fort Payne Furnace Company of Fort Payne, Ala., and has given bond in \$40,000.

Pitkin & Webster, assignees of the Variety Iron Works of Cleveland, Ohio, have filed a report showing the present liabilities to be \$313,127.13 and the assets \$258,552.90. The works are now being operated by the assignees.

Last week the Totten & Hogg Iron and Steel Foundry Company of Pittsburgh, Pa., received an order from the National Tube Works Company of McKeesport, Pa., for one large fly wheel, 22 feet in diameter, weighing 35 tons.

The McKinley Tin-Plate Company of Pittsburgh have made application for a charter of incorporation. The new concern propose to erect works at Wilkesburg, a suburb of Pittsburgh, and will erect tinning pots for coating the sheets. The incorporators of the new concern are: E. S. Wangenheim, L. H. Smith, H. Y. Haws, S. W. Cunningham and Richard B. Scandrett.

Machinery.

The Westinghouse Electric and Mfg. Company of Pittsburgh have secured the contract for furnishing the motors to be used in the new electric line now being built by the Pittsburgh and West End Railway Company in that city. The contract calls for 50 motors, and at the power house they will put in four large generators.

The Marinette Iron Works Company of Duluth have just completed the first large triple-expansion marine engine built northwest of Milwaukee. It has cylinders 20, 32 and 54 inches, and 42-inch stroke, and is expected to develop nearly 1000 horse power. It will be placed in Whaleback No. 121 of the American Steel Barge Company's build. A fore and aft, marine type, engine completed during the winter by the Marinette Company is now running the new half of the Duluth Imperial Mill, and is turning out about 300 barrels of flour daily. Power from this engine is transmitted through the mill by hemp rope instead of belting.

Notwithstanding the recent extensive additions to their works, which more than doubled their capacity, the Campbell & Zell Company of Baltimore are crowded with orders for the Zell improved water-tube safety boilers, and have recently closed contracts for the following plants: The Central Railway Company, Baltimore, Md., 675 horse-power; the Baltimore City Passenger Railway Company, Baltimore, Md., 1800 horse-power; The South Park Electric Light Company, Chicago, Ill., 450 horse-power; The Michigan Brass and Iron Works, Detroit, Mich., 150 horse-power, besides a number of smaller boilers, including two 40 horse-power boilers for Otto Sutro & Co., and one 25 horse-power boiler for the Thomas Wilson Sanitarium for Children, both of Baltimore. In addition to this, they have also contracted with the World's Columbian

Exposition at Chicago for 2500 horse-power Zell boilers, for supplying power at the fair.

The Trenton Iron Company, Trenton, N. J., have just erected wire-rope tramways on the Bleichert system for the Amethyst, and Holy Moses Mining companies at Creede, Col., and are now constructing one in Mexico. These tramways are now being very extensively adopted for mining and quarrying work, their advantages as feeders to established systems of railroad or water communication being readily apprehended on the score of economy in the low cost of construction and celerity of operation, together with the capability of surmounting any grades. They have been supplied by the company to mining works in all parts of the United States, and also in Peru, and this branch of business is now receiving their particular attention. One special recommendation of the Bleichert system is that the lines can be adapted to individual loads up to 1000 pounds, and even more in special cases, whereas under the former system 150 pounds was usually the maximum weight that could be carried in one load. We are informed that in the case of one quarry to which their quarry cable hoist was fitted the cost of transportation was reduced from 40 cents to 5 cents per load.

The Warden Mfg. Company have plenty of business on hand at their works, Eighteenth street and Allegheny avenue, Philadelphia. They are just now engaged on a large contract with the New York Filter Company for building a number of filters 30 feet long and 8 feet in diameter for the city of New Orleans, and are also constructing 1600 horse-power of horizontal safety boilers, which are to furnish a portion of the power at the Columbian Exposition, Chicago.

The Egan Company of Cincinnati, Ohio, are the recipients of some large orders for wood-working machinery from Lima, Peru. The foreign trade of this famous concern is on the jump all the time. Progressive machinery and methods will always find a market.

Girard, Ohio, according to the local papers, offers a bonus of \$25,000 and 12 acres of land for the removal there of the Coleman, Shields & Co.'s rolling mill of Niles.

An addition 7 x 90 feet is being built to the rolling mill of the Benedict & Burnham Mfg. Company, at Waterbury, Conn.

The plant of the Norristown Steel Company, at Norristown, Pa., is being enlarged by the addition of 20 feet to the main building. Two 20-ton electric cranes have been received and will travel the entire length of the main structure.

The Leffel Water Wheel and Engine Company of Springfield, Ohio, make the announcement that they have found their name too long for convenient use and have, therefore, adopted the name of the president. The company will hereafter be known as the W. C. Leffel Company. They are the manufacturers of the James Leffel turbine water wheels, steam engines and boilers.

The Spencerville Machine Company, capitalized at \$20,000, will establish a plant at Spencerville, Ohio.

J. H. Horne & Sons Company of Lawrence, Mass., have placed an order with the Berlin Iron Bridge Company of East Berlin, Conn., for a new machine shop 64 x 107 feet in size.

The Ashland, Wis., Foundry Company have begun the erection of a new plant, comprising the following structures: Foundry 50 x 46 feet; machine shop 24 x 50; smithing room 21 x 50, and an office building 20 x 32 feet.

The stockholders of the Lebanon Chain Works, Lebanon, Pa., have voted to increase the capital stock from \$10,000 to \$20,000.

Burr & Bailey, proprietors of a foundry, machine shop and copper works at Wilmington, N.C., have incorporated as the Burr & Bailey Company, with a capital stock of \$60,000.

The extensive plant of the Wollaston Foundry Company at Quincy, Mass., has been burned, together with patterns in storage for outside parties valued at \$40,000. The loss to the company is \$30,000.

J. P. Saunders and J. R. Biggs will erect a foundry and machine shop at Bartwell, Ky.

The Norfolk and Western Railroad will erect machine and repair shops and round houses at Kenova, W. Va.

J. H. Crabtree is preparing to erect a machine shop at New Berne, N. C.

Long & Jervis, Decatur, Ala., have invented a swing sectional cupola furnace, and will erect a plant at Decatur to manufacture it.

The Arctic Machine and Mfg. Company have been incorporated at Cleveland, Ohio, with a capital stock of \$200,000, for the purpose of manufacturing and selling machines and machinery of all kinds, including boilers and engines, and especially ice ma-

chines. The incorporators are: Martin Bonnell, Frank Wilson, Henry S. Sherman, A. C. Dustin and C. A. Judson.

The Marietta Mfg. Company, Marietta, Ohio, have been granted a charter of incorporation, with a capital stock of \$75,000, for the purpose of manufacturing engines, steamboat machinery, plows and plow castings, stoves and hollow ware.

The Cincinnati Milling Machine Company, Cincinnati, Ohio, are now occupying their new shops on Spring Grove avenue, which have been supplied with all the modern improvements, including the latest and most perfect machinery and appliances adapted to the production of their specialties. They report the demand for their milling machines as being exceedingly satisfactory up to the present, and since removing to their new shops are in position to fill all orders promptly.

Work on the guns of different caliber at the Watervliet, N. Y., Arsenal, goes on regularly and considerably quicker with the improved facilities for handling and shrinking the guns. Eight 8-inch guns have already been altered according to special orders. The improvement in the general appearance of the new shop and its surroundings, as the contractor's tools and machinery are removed and the general clearing up takes place, are very noticeable. Notwithstanding the large amount of specially devised machinery which has been brought forward for the equipment of the shop more is still being set up. Dedrick & Harvey have already received and set up two ponderous jacket lathes, capable of doing a great deal of extra work. A large rifling machine and lathe are to be put up, the latter being from the Pond Tool Company, the manufacturers of the great lathes already placed in the north wing. Workmen have made a deal of progress in laying the great floor of the south wing, and nearly if not quite all of the machinery for use in the south wing is placed there on its arrival. The work on the powerful electric crane goes steadily on, and it is thought that it will be in position and ready for use July 1. The piers of masonry which will constitute the supports for the large shaft crossing the north end of the south wing in the large rock trench have been set, and the trench presents a fine appearance since its walls have been dressed and washed. Men are engaged in excavating for the foundations for the heavy pieces of machinery in the south wing, and the whole interior presents a scene of general activity. Workmen are also removing parts of the old heating furnace in the old shop, and it will be entirely remodeled. A carload of forgings, including a trunnion for a 12-inch gun, besides several 10-inch hoops, arrived recently.

The Eddy Valve Works of Waterford, N. Y., constitute one of the most thriving industries of that town. Thomas A. Knickerbocker of Troy is president. The works are run by water power, but a large engine and boiler are constantly in readiness in case of a failure of water to supply motive power within five minutes. The works employ nearly 100 men, of whom over one-half are in the machine shop, located on the south, while the molding and casting are done in the large structure to the north. The plant is a valuable one, the pay roll being one of the largest in Waterford. The concern manufactures brass and iron valves, ranging in size from $\frac{1}{2}$ to 56 inches, and they are made for water, air, steam or gas. They also make fire hydrants, wash hydrants and garden hydrants. At present they are engaged on a contract for the United States Government, for which they are making a number of 24-inch solid brass valves. Sufficient orders are now booked to run the works day and night through the summer. The concern has been obliged to run overtime for some months to supply orders, which they find it almost impossible to keep up with. A short time ago a large addition was made to the works and a further extension is contemplated in the near future.

The Fort Edward, N. Y., Iron and Machine Company are filling a large order for the Sherman & Burdick saw mills, at Greenwich, N. Y.; also for a quantity of machinery for Emerson & Co of Warrensburg, N. Y.

There has been a rumor prevalent at Rochester, N. Y., for some time to the effect that the Woodbury Engine Company were to manufacture their engines and boilers on a larger scale, perhaps, than any other stationary type of engine and boiler in the country, and also that the company's shops were to be removed from Rochester. President Henry H. Pryor of the company has confirmed the reports. Mr. Pryor states that the patterns and flasks are being loaded in cars, and that the old works of the company have for years been too small to permit of an output large enough to supply the demand, and that negotiations had been entered into with parties in various cities, among them being the Burnhams of the Baldwin Locomotive Works, Philadelphia. The

Burnhams and those interested with them, under the style of the Stearns Mfg. Company, have purchased at Erie, Pa., 13 acres of land on the line of several railroads; have erected buildings covering over 5 acres of it and fully equipped the shops with tools of the most modern design. Here all the known labor-saving devices for machine shops, foundry and boiler shops are in use. The works are under the immediate supervision of the general manager and engineer, residing at Erie, John T. Boyd, formerly connected with the Rogers Locomotive Works and the Yale & Towne Mfg. Company. The general sales agent, with headquarters at Philadelphia, is John F. Haskins, mechanical engineer, and he has as his right hand man, residing in New York City, William J. Creelman, who for 15 years has been identified with the Woodbury Engine Company's interests. He has devised many improvements for the apparatus manufactured by the company. Some of his best plans were those for the high-speed engine. The prospects for the Woodbury Engine Company at present look very bright. Sales agencies are to be located in all the principal cities, and the foreign trade will be cultivated. The contract has been signed for the placing of 1000 horse-power of Woodbury condensing engines for the World's Fair. Mr. Pryor says that there has been turned out by the company at Rochester over 300,000 horse-power of engines and boilers, and that there are now some 3600 Woodbury engines and boilers in use. The loss of the concern is regretted in Rochester.

The machine shops of Bement, Mills & Co., Philadelphia, continue their condition of activity. A great deal of heavy work in the line of large machine tools is in hand, and further contracts for the same class of goods are anticipated. A large proportion of the works are now running on double time, and they have a full complement of hands in regular employment. They have just constructed for the Baldwin Locomotive Works, Philadelphia, a large double headed frame-slotting machine with 3 feet stroke, capable of boring out eight frames at once, and having more than twice the size and capacity of any similar tool hitherto turned out from these works. They have also made a three-spindle borer for boring compound cylinders for locomotives, and a two-spindle machine for boring the crossheads for the same. There are at present in hand the following machine tools, all in a more or less advanced stage of completion: For the Carnegie Bros. Steel Works at Pittsburgh a rotary planing machine for planing the edges of steel armor plates; also a rotary sawing machine for cutting similar plates. Both these tools are of 7 feet diameter. For Cramp & Son's shipyard at Philadelphia, a fine universal boring and drilling machine 30 feet long and 20 feet wide. Also a considerable quantity of hydraulic machinery, riveters, cranes, flangers, &c., and four or five large steam hammers are on the stocks for various parties, giving ample occupation to the staff of this establishment.

Hardware.

Clark Bros. Lamp, Brass and Copper Company, Trenton, N. J., are doing a very large business in artistic lamps of all descriptions, particularly in their specialty, the Trenton center draft lamps, which are obtaining a wide popularity in all parts of this country, and are being exported in considerable quantities to South America, India, Australia and the South African Colonies. The lamps are of very beautiful design and finish. The company's works at Trenton are of considerable extent, and one of the principal buildings has just been enlarged by the addition of two stories, with a view to increasing the storage capacity and providing more room for the brass manufacturing department. The present firm is a consolidation of the Clark Bros. Company, the McLewee Brass Mfg. Company and the Globe Lamp Works of Trenton. They have a branch office and showrooms at 43 and 45 College Place, New York.

Spring Curry Comb Company, South Bend, Ind., have commenced the erection of a new plant, which they expect to occupy about July 1. The main building will be 40 x 160 feet, three stories, brick, fitted with improved and special machinery, tools and fixtures, the whole being so planned, we are advised, that future additions can be readily and conveniently made.

The Dibble Mfg. Co. are on the point of removing their establishment from their present quarters at Mott street and South Clinton avenue, Trenton, N. J., to larger premises on the other side of the city. The brass foundry lately added to their plant will be transferred and enlarged, and other additions and alterations will be effected at the new works. Increase of business has obliged the company to take this step, and they expect to be able to double their present manufacturing capacity thereby. They are now getting out several

new lines of builders' hardware, and intend simplifying those already made by them, and carrying a large stock of goods in future. They have recently been paying special attention to the production of Hemacite castings and the door knobs, rollers for skates, pulleys and other articles formed of this material are now being extensively used.

The Crescent Horse Shoe Mfg. Co. will erect a plant at Max Meadows, Va., for the manufacture of horse shoes, &c.

Bernard Gloekler, 1117 Penn avenue, Pittsburgh, Pa., is erecting a new building for store, office and factory use, 48 x 100 feet, six stories high. It will be equipped with two elevators, together with the best machinery.

Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, advise us that the N. Y. C. and H. R. R. have specified their patent mandrel-rolled hollow staybolt iron in the construction of the 100 new locomotives recently ordered from the Schenectady Locomotive Works. The company also state that the economy and safety of these irons have prompted a gratifying demand for them from many railroad companies.

Cronk Hanger Company, Elmira, N. Y., have just erected an addition to their factory, and propose to add drop forging to their present business. They refer to trade as never so good as during the present season, collections being better than at any time during the past three years. The company state that they are not only selling their goods in every part of the United States but are getting some export orders from South America, and have recently had some trade with India.

Cincinnati Barbed Wire Fence Company, Cincinnati, Ohio, will start in a couple of months a new Bates-Corliss 1000 horse-power engine. They state that their capacity for plain wire is about 200 tons per day, and for barbed wire 100 tons. Their sales are referred to as having increased 25 per cent. this year over last. In addition to the above the company are also turning out about 500 kegs of wire nails per day. Their product is sold chiefly in the South, Southeast and States of Ohio, Indiana and Illinois. The company state that they will make \$25,000 worth of improvements in their plant during the coming summer.

The Bird Paper Mfg. Company, 103 Chambers street, New York, and Phenix Building, Chicago, are manufacturing an average of 200,000 square feet of building paper per day. They state that they are making arrangements to double their capacity during the approaching summer.

E. S. & F. Bateman, Grenloch, N. J., are pushed with orders. Besides their domestic trade, reaching into every section of the United States and Canada, they state that their goods seem to be finding favor in a number of foreign countries—namely, the British Isles, Continent of Europe, Australia, New Zealand, South Africa, &c. They refer especially to their Iron Age riding cultivator, put on the market some time since, for which there has been a gratifying demand.

Bissell & Thornhill, manufacturers of the Little Giant potato and corn scoops, Milford, Mich., state that though their goods have been on the market for a comparatively short time they are meeting with an excellent demand. Last year, in addition to selling all over the United States and Canada, they shipped a large bill to Sweden; also to Germany, Australia and South America. They have also a factory at Walkerville, Ont., for the Canadian trade.

N. R. Davis & Sons, manufacturers of sporting fire arms, Freetown, Mass., have during the past year enlarged their plant and doubled their capacity and are now fully employed in filling orders.

The St. Louis Railing Works, St. Louis, recognizing the demand for improved methods in the construction and finish of art metal work have provided facilities which enable them, we understand, to produce work of especial merit. Their works are located at 107 South Seventh street and are equipped with machinery and appliances for the manufacture of work from the plainest to the most elaborate wrought scroll work, finished in any of the beautiful effects produced by electric bronzing and oxidizing, while they are also the licensees and operators of the rust proof furnace process, imparting to articles treated, it is stated, a beautiful and permanent tone, known in the trade as the "Black Iron Finish." The counter railings and partition screens in the *Globe-Democrat* counting room, St. Louis, which have excited much favorable comment, is one of the contracts for fine metal work in the black iron finish lately completed by the works, who have also equipped with ornamental metal work many office buildings, banks and opera houses in the West, among which may be mentioned the Franklin Bank, St. Louis; St. Louis

National Bank; Corn Belt Bank, Blomington, Ill.; Ricker National Bank, Quincy, Ill.; Citizens' State Bank, Sterling, Kan.; Hagan Opera House, St. Louis; Kearney Opera House, Kearney, Neb.; Lansing Theater, Lincoln, Neb., and the office of the New Hotel Palmer, Paducah, Ky.

Flint & Walling Mfg. Company, Kendallville, Ind., advise us that they are now adding 39,500 square feet of floor space for the manufacture of their new steel Star geared mill and steel windmill towers.

Orlando Moseley, manufacturer of Excelsior fence machines, picket mills, bolting mills, &c., Peru, Ind., has recently added a new storeroom in which to display bee keepers' supplies exclusively. He has also fitted up a general repairing department, with engine lathes, drill press, wood planer lathe, band saws, molding machine, &c., where a general repairing business in wood and iron will be done.

Geo. A. Blanchard, so long at the head of the Porter Blanchard's Sons Company, Concord, N. H., has retired from the business, which is now conducted by a stock company with increased capital and facilities. We are advised that the business has doubled since last year and that the company are shipping churns to England, Ireland, Scotland, Australia, Germany, Russia, South America and all parts of the United States. They manufacture 14 sizes of factory churns, both round and square, and eight sizes of the smaller churn, including a new churn recently put on the market called the Lightning, which is of a cheaper grade. This company are also making the Babcock milk tester and butter carriers, boxes and molds. W. G. Hancock is general manager of the company.

Eagle Pencil Company, 73 Franklin street, New York, have recently added to their works a complete plant for the manufacture of steel pens. They state that they make these pens by a new and original process with the aid of the latest American machinery, which has been especially built for them for that purpose.

Standard Stamping Company, St. Louis, Mo., will very shortly erect a five-story factory building, 150 by 240, which will place them in position to manufacture very largely in their line.

Page Belting Company, Concord, N. H., are this season putting up four new buildings, the main factory building to be 260 feet long, 54 feet wide and three stories high. The company advise us that these buildings will greatly improve their facilities for making belting and lacing, and they hope to get them in running order by December 1 next.

Sheldon Axle Company, Wilkesbarre, Pa., report that trade with them is good, the sales of the present year exceeding in volume those of any former year. Their output is about 400,000 sets per annum.

Detroit Machine Screw Works, Detroit, Mich., have recently purchased a site for a new factory. The site in question fronts 200 feet on Riopelle street and 100 feet on both Gouin and Atwater streets. A railroad track runs alongside the iron room and coal bins, and a 6-inch water pipe connects it with the Detroit River, from which its water supply will be obtained. The new building will be three stories, with a high basement. It will be built of brick, with steel frame and stone trimmings.

Hollands Mfg. Company, Erie, Pa., have recently added two new lathes to their machinery to help them out on their increased business. They are also erecting a 40 x 50 brick warehouse, three stories and basement, to enable them to carry more stock to fill orders promptly.

The Herbrand Company, Fremont, Ohio, have completed a fireproof forge room which is designed to take the place of the wooden one recently destroyed by fire. The company are now in position to make not only their own special forgings, but are also prepared to make dies and forgings to order.

New Jersey Car Spring and Rubber Company, Jersey City, N. J., during the past year have added very materially to their capacity in the matter of new and improved machinery, and have also taken up the manufacture of bicycle tires. They have a larger force of men than ever before in their experience and are working their factory to its full capacity 14 hours per day.

Cincinnati Tin and Japan Company, Cincinnati, Ohio, will remove from their present quarters to the corner of Sycamore and Canal streets about July 1, having purchased the building now occupied by the Enquirer Job Printing Company. This building is 160 feet on Sycamore street, running back to the canal 260 feet. The company are also putting in new and improved machinery, which will increase their production. They will have a sample room on the first floor about 140 feet long and 20 feet wide, and intend to fit it up in

attractive style. The company have increased their capital stock to \$50,000. They refer to the prospect for the coming year as regards their goods as very fair.

Theo. J. Ely Mfg. Company, Girard, Pa., are employing 30 hands in the manufacture of their Dandy rat trap, Metallic horse rake, Safety bull leader, Handy thill anti-rattler, Domestic clothes dryer, Automatic chimney and fruit jar cleaner, Eureka carpet stretcher, &c. They occupy two buildings, one three stories and basement and the other two stories, and have 1200 square feet of floor space. The company state that the pressure of orders is such that they are expecting to erect another building in the fall. They also state that they are enjoying an excellent export trade on their goods.

The Enterprise Mfg. Company, Akron, Ohio, advise us that they have been for the past three months working a night force, being taxed to the full capacity of their business. About 160 hands are being employed. They also report an excellent demand for their improved horse collar sweat pad, which is made at their branch factory, North St. Paul, Minn., where about 25 hands are given employment.

Illinois Iron and Bolt Company, Carpentersville, Ill., recently completed an addition to their foundry 75 x 200 feet, and are now finishing up the inside of a large warehouse 100 x 200 feet, three stories high. The lower floor will be used for the storage of wagon skeins, the second floor for the finishing and storing of copying presses, &c., and the third floor for storing jack screws, drills, tire shrinkers and other blacksmith tools. In the southeast corner of the second floor their office will be located. 32 x 60 feet, with a large two-story vault attached. They have just commenced work on an addition to their machine shop to be 60 x 70 feet, two stories high. All the buildings are substantially constructed of brick and stone. They advise us that they have experienced a rapid and healthy growth of their business during the past year, and they are now melting upward of 50 tons of pig iron per day, using also a large quantity of wrought iron and steel in the manufacture of the various articles in their line.

Miscellaneous.

Jas. Rees & Sons of Pittsburgh have about ready for shipment the last of four steamboats that they have built for use on the Magdalena River in Colombia, South America. These boats are for passenger and freight traffic and are about of the same type as the average stern-wheel boat seen on American rivers. The boats are stern wheelers 120 feet long and 25 feet stern. They are shipped to New York by rail and thence by vessel to their destination.

The Pittsburgh agency of the Murphy Iron Works of Detroit, Mich., have received a contract for eight Murphy smokeless furnaces to be placed in the works of the Cambria Iron Company, at Johnstown, Pa. A number of the Murphy furnaces recently placed in the new plant of the Pittsburgh Wire Company, at Braddock, Pa., have been put in operation with satisfactory results.

Duluth Mfg. Co. of Duluth, Minn., have contracted to deliver 400 box freight cars, 34 feet inside, to the Wisconsin Central Company. They have contracted with Duluth, Mesaba and Northern road for 250 25-ton ore cars to be completed in August and will probably build the entire freight equipment of the road. They are also building six cabooses for Duluth and Iron Range road.

The new ore dock of the Duluth and Iron Range road will be ready to ship ore June 1. This dock is the highest ever built, being 52 feet from the water level to track floor. It is designed particularly for soft and clay-like ores.

The Minnesota Iron Company, whose mines are at Tower, near Duluth, Minn., are purchasing a complete hoisting plant for use at their deeper pits. The company will mine at Tower 550,000 tons this year and at Ely 500,000 tons.

The Trenton Malleable Iron Company, Trenton, N. J., have just completed the first year of their corporate existence, and are reported to be in a thriving condition. Their special line of manufacture is in railroad supplies, car couplers, frog and switch castings, street-car supplies, &c., and for these a ready market is obtained. The company's works are very favorably situated in East Trenton, and the lines of the Philadelphia and Reading and Pennsylvania railroads running through their premises afford excellent facilities for shipping their goods, while there is ample ground space for future extension of plant.

Arrangements for the Binghamton, N. Y., Industrial Exposition are progressing nicely. Work will soon be commenced on the premium lists. Business men and manufacturers have been requested to announce it if they desire to give special premiums.

TRADE REPORT.

From Pittsburgh we have reports of a noticeable improvement in the demand for some lines of finished material, such as Steel Plates, Wire Rods, Plain and Barb Wire and Wrought Pipe. But while the outlook is thus better as to volume of business, an advance in prices is not expected at present.

Heavy deals in Pig Iron are pending at Pittsburgh. Bessemer appears to have settled down to \$14.25 for early delivery, at which a block of 10,000 tons was sold, while 2000 tons brought \$14.40, delivered. Steel Billets are quoted at \$23.35 @ \$22.75 at Pittsburgh, but large buyers are endeavoring to force prices lower, claiming to have had offers at \$22.25.

Other Northern markets report increased business in Pig Iron. The month of May promises to show a very large tonnage of sales. The tendency of furnacemen in some parts of the country, in which commission houses have hitherto controlled the Pig Iron trade, to ignore them and make sales direct to consumers, prevents many trades from becoming public. Taking the aggregate of business known to have been done in the leading markets the past week, it will not be surprising if stocks at furnaces show a good decrease on the 1st of June.

Finished Iron and Steel are suffering severely from the competition among makers for such business as is now coming forward. The prices published this week touch the lowest depth thus far reached in this period of depression. The Agricultural Implement makers, who have for the past two years been the dependence of important producing interests, find their prospects clouded by the heavy and long-continued Western rains and are now waiting for information as to crops before making contracts for season supplies. Their absence from the market cannot fail to be felt.

Old Material continues to decline in price, and cannot be expected to rally as long as new material, especially Steel, is so cheap. A sale of Old Iron Rails at \$17.50, at a Long Island Sound port, marks the lowest point in this item reached for many years in Eastern markets.

A decline in Copper was expected to follow the opening of lake navigation, but it failed to occur. Lake Superior Ingot has sold in fair lots at 12¢ @ 12½¢. Pig Tin has advanced 30¢ @ 35¢ @ 100 pounds. Fully 600 tons have changed hands here the past week and the market is still strong. Idaho mining troubles cause a scarcity of Lead Ores in some quarters, and the surroundings are reported favorable for an advance, but there is a lack of speculative interest. Spelter is somewhat easier here, but firm at St. Louis, with few transactions. The Tin-Plate market has a somewhat better tone. Arrivals from abroad have been more liberal of late, and the spot supply is more ample. Imports have returned to what is considered normal proportions.

Our London cable report shows increased firmness in British Pig Iron on account of the continued reduction in stocks. The Durham Coal miners' strike shows no signs of terminating. Pig Tin is up to £95. 12/6, spot. Heavy supplies of Pig Lead keep prices low.

Philadelphia.

Office of *The Iron Age*, 230 South Fourth St.,
PHILADELPHIA, Pa., May 17, 1892.

There is very little of interest to note in the general condition of business, which, while large in the aggregate, is much below what was expected. No satisfactory explanation can be given for the continued dullness, nor can any definite information be given in regard to when an improvement may be expected. Business is dull, and prices are low, and as yet there are no indications of reaction. The fact that the output of Pig Iron has been largely reduced may result in better prices for that article, but unless there is a general increase in consumption, business as a whole cannot be expected to improve. The large consuming interests are not in a condition to impart much vigor to the Iron trade, and until there is a better demand for Rails and Railway Equipments business must remain as at present—dull and unsatisfactory. How soon this will come is a matter of complete uncertainty, but as it is the unexpected that happens, it may come just at the time when by general assent an indefinite postponement has been agreed to.

Pig Iron.—Business during the week has been larger than for some time past, many large buyers having about made up their minds that purchases at current figures are perfectly safe, while delay might be dangerous. Hence the volume of business has been considerably heavier than usual, including all grades at all prices, and in all sized lots from 500 tons up to 5000 tons each. It is obviously impossible to do more than mention prices in a general way, exact details being impracticable. For Southern No. 3 Iron, however, we hear of from \$12.75 to \$13, as having been paid for deliveries at points between and from Baltimore to Philadelphia inclusive. No. 2x \$13.75 @ \$14.50, and No. 1 \$15 @ \$15.50. For choice Pennsylvania and Virginia Irons an average of 25¢ @ 50¢ more has been obtained, but usually for small and medium sized lots, although it may be remarked that this class of Iron is in smaller supply and is less urgently offered than are Southern Irons at the lower figures. Taking the market as a whole, it is probable that the tendency is slightly in sellers' favor. That is to say, there is more disposition to place orders and furnaces are a little less encumbered with stocks than they were a few weeks ago. Beyond that there is nothing more encouraging than before, excepting the decreased output. General quotations therefore may be given as follows, subject to a shading of 25¢ @ 50¢ for Southern Irons, at points in which freights favor them to that extent.

American Scotch, No. 1x.....	\$17.00	@	\$17.50
American Scotch, No. 2x.....	16.00	@	16.50
Standard Penna. (Lake Ore), No. 1x.....	16.00	@	16.50
Standard Penna. (Lake Ore), No. 2x.....	15.00	@	15.50
Standard Penna. (Lake Ore), No. 2 plain.....	14.00	@	14.50
Medium Quality, No. 1x.....	15.50	@	15.75
Medium Quality, No. 2x.....	14.50	@	14.75
Standard Virginia, No. 1x.....	15.00	@	15.50
Standard Virginia, No. 2x.....	14.25	@	14.75
Medium Va. and Southern, No. 1x.....	15.00	@	15.25
Medium Va. and Southern, No. 2x.....	14.00	@	14.25
Standard Penna. and Virginia Forge.....	13.75	@	14.25
Ordinary Forge.....	13.00	@	13.25
Hot-Blast Charcoal.....	18.50	@	21.00
Cold-Blast Charcoal.....	24.00	@	26.00

Steel Billets.—There is some inquiry for lots of 200 or 300 to 500 tons each, but buyers seem unable to make up their minds what prices to offer. Makers quote \$24.60 @ \$25 for Schuylkill Valley and about 50¢ less for Susquehanna deliveries, but buyers intimate that they can do very much better than the figures named, although it is largely a matter of freight rates. There is no reason to doubt that \$24.75 would be

accepted for Schuylkill Valley points for a desirable order on a firm offer; but, as we said before, buyers do not seem willing to close anything, unless for material that is required at once. Hence quotations are nominally from \$24.50 to \$25, according to quantity, point of delivery, &c. Tone of the market weak and unsettled. P. S. —Quotations made to-day for May deliveries are \$24.60, Philadelphia or equivalent points, and \$24.90 for later dates. Freights from Pittsburgh are down to \$2 for the current month, but after June 1 they are to be advanced to \$2.30, hence the difference in quotations between May and June.

Steel Rails.—There is little more activity, but at best the demand is slow and disappointing. Prices are maintained at \$30 at mills, however, and as that figure is no inducement for buyers to anticipate their requirements, sales are not likely to be other than hand-to-mouth lots until there is some change in the outlook.

Muck Bars.—There is very little business to report, the demand having been largely superseded by the use of steel. A few small lots change hands occasionally, at prices varying from \$24.75 to \$25.25, delivered, but there is no general demand, so that prices are more or less uncertain, according to the degree of pressure to sell.

Bar Iron.—Business is of the same general character as heretofore reported, and as yet shows no sign of increased vitality. Some mills claim to be running full all the time, but in the majority of cases it is found hard to keep up to more than half to two-thirds capacity, and even then prices have to be made so low as to leave little or no margin to the manufacturer. Prospects are not specially encouraging at present, although it is hoped that things will begin to move after the mid-summer holidays, if not sooner than that. Prices are irregular, but 1.60¢ @ 1.65¢ at interior points and 1.67½¢ @ 1.72½¢ for city deliveries are fair average quotations for best refined Bars.

Plates.—Market extremely quiet, and much less business offering than many in the trade seemed to expect. There is no large work going on whatever, and while a 500-ton order may be met with once in a while, the general run of business is carload up to 100-ton lots. All the large consuming interests appear to be slacker than usual at this season, and until there is some improvement in demand prices must remain as they are now weak and irregular, but nominally about as follows:

	Iron	Steel
Tank Plates.....	1.80 @ 1.90¢	1.75 @ 1.85¢
Shell.....	2.10 @ 2.20¢	2.10 @ 2.20¢
Flange.....	2.70 @ 2.90¢	2.30 @ 2.40¢
Fire Box.....	3.00 @ 4.00¢	2.60 @ 2.80¢

Structural Material.—There is very little change to note in this department, and mills compete sharply for new business, which is mostly in small or medium sized lots. Prices are irregular, and concessions not hard to obtain when the order is sufficiently large to make it worth competing for. Nominal quotations are about as follows: From 1.85¢ to 1.90¢, delivered, for Bridge Plates; 1.80¢ @ 1.90¢ for Angles, and 2.20¢ @ 2.30¢ for Beams, Channels or Tees.

Sheets.—There is the usual demand for small lots, but it is difficult to place large lots without making some concessions from the usual asking figures. Common qualities are in large supply at low figures, but for best makes prices are held about as follows:

Best Refined, Nos. 14 to 20.....	2.40¢ @ 2.60¢
Best Refined, Nos. 21 to 24.....	3.00¢ @ 3.10¢
Best Refined, Nos. 25 to 26.....	3.20¢ @ 3.25¢
Best Refined, No. 27.....	3.40¢ @
Best Refined, No. 28.....	3.50¢ @
Common, ½¢ less than the above.	

Quotations given as follows are for the best Open-Hearth Steel, ordinary Bessemer being about ¼¢ lower than are here named:

Best Soft Steel, Nos. 14 to 20.....	3¢ @ 3½¢
Best Soft Steel, Nos. 21 to 24.....	3½¢ @
Best Soft Steel, Nos. 25 to 26.....	3½¢ @
Best Soft Steel, Nos. 27 to 28.....	4¢ @
Best Bloom Sheets, ¼¢ extra over the above prices.	
Best Bloom, Galvanized, discount....	@ 67½ %
Common, discount.....	@ 70 %

Old Material.—The demand is somewhat irregular, and, unless for a class of material that may happen to be wanted, prices are not very firm. Asking prices are about as follows, but under forced sales concessions would be necessary to secure a good buyer: \$16 @ \$16.75, delivered, for Heavy Steel Scrap, and up to \$19 @ \$19.50 for low phosphorus. General quotations about as follows: Iron Rails, \$20, spot, or \$21, delivered; Steel Rails, \$16 @ \$16.50, delivered; No. 1 Railroad Scrap, \$18 @ \$19, Philadelphia, or for deliveries at mills in the interior \$18.50 @ \$19, according to distance and quality; \$13 @ \$14 for No. 2 Light; \$13 @ \$14 for best Machinery Scrap; \$13 @ \$14 for Wrought Turnings; \$9 @ \$10 for Cast Borings, and nominally \$22 @ \$24 for Old Fish Plates, and \$15 @ \$16 for Old Car Wheels.

J. W. Hoffman & Co. have been appointed Eastern agents of the Hainsworth Steel Company of Pittsburgh, Pa., and are prepared to furnish Bessemer Steel, of best standard grades, in Blooms and Slabs of the following sizes:

Blooms.—4 inch x 4 inch, 80 lb, to 13 inch x 14 inch, 5000 lb.	
Slabs.—Minimum thickness, 2 inches. Maximum width, 22 inches. Weighing 80 lb to 5000 lb.	
Smallest section, 16 square inches; largest, 182 square inches. Shortest length, 18 inches. Sizes advancing by ¼ inch.	

Chicago.

(By Telegraph.)

Office of *The Iron Age*, 59 Dearborn street, 1
CHICAGO, May 18, 1892.

Pig Iron.—In the way of inquiry for new business the past week was very quiet. Charcoal buyers have not changed their position regarding the price and no transactions of any importance occurred. Orders for carloads or small lots are the practice, and will likely continue so until one side or the other becomes weary of the waiting. The increase in the stocks of Iron in furnace yards, as shown by the last monthly report, was a general surprise, and materially strengthened consumers' views on the chances of placing their orders at \$16 before reaction sets in. A number of negotiations for large stocks of Foundry Irons that have been pending for some weeks were closed at prices slightly below our quotations. By the closing of these sales 20,000 tons have been removed from the available supply of Iron in this market. When it became known that these sales were closed confidence was in a measure restored and considerable improvement experienced in the demand from smaller buyers. The immediate effect of these transactions was the stiffening of prices named and to temporarily allay the persistent efforts to secure better. There not being anything to warrant alterations, we continue the following quotations, cash, f.o.b. Chicago:

Lake Superior Charcoal.....	\$16.50 @ \$17.00
Local Coke Foundry, No. 1.....	14.50 @ 15.00
Local Coke Foundry, No. 2.....	14.00 @ 14.50
Local Coke Foundry, No. 3.....	13.50 @ 14.00
Local Scotch.....	15.00 @ 16.00
Ohio Strong Softeners.....	16.50 @ 17.25
Southern Coke, No. 1.....	15.00 @ 15.50
Southern Coke, No. 2.....	13.75 @ 14.25
Southern Coke, No. 3.....	13.25 @ 13.75
Southern, No. 1, Soft.....	13.75 @ 14.25
Southern, No. 2, Soft.....	13.00 @ 13.50
Southern Gray Forge.....	12.75 @ 13.25
Southern Motiled.....	13.00 @ 13.50

Tennessee Charcoal, No. 1.....	17.50 @	18.00
Alabama Car Wheel.....	21.00 @	23.00
Coke Bessemer.....	15.50 @	16.70
Hocking Valley, No. 1.....	17.00 @	17.50
Jackson County Silvery.....	17.00 @	17.50

Bar Iron.—Nothing has occurred that changes the conditions of this market. Buying in small lots is quite active; large orders are still held in abeyance, if they exist. Prices are weak and irregular. Makers of Refined Iron are disheartened over the course pursued by the Common Iron makers, and decline to make corresponding reductions. So far as can be determined, the range of prices on Common Iron continues to be from 1.40¢ to 1.45¢, half extras, at mill. A better grade of Iron Bars is quoted at 1.50¢ @ 1.60¢, at mill, according to the quantity of extras the specifications carry. 8 ft Steel Bars are in good request at 1.70¢, Chicago.

Structural Iron.—There is an abundance of bridge work in sight and makers of this material are having no trouble in securing enough business to keep their mills in full operation several months ahead. Orders for Building Shapes are a little scarce just now, though it will be only a short time when architects will again be calling for back shipments and mills be unable to fill orders if reports of proposed new structures can be relied on. Competition for orders is constantly weakening prices and quotations on Beams and Channels are now made at 2.05¢, Chicago delivery, with rumors circulated that 2¢ is becoming a familiar figure on desirable business; on 20-inch ½¢ additional ½ lb and on 24-inch ¾¢ additional ½ lb is asked.

Billets and Rods—It is said that there has been inquiry for some small blocks of Billets at prices not satisfactory to local producers, who were undersold by Pittsburgh makers. A nominal quotation on Billets is \$24.50 and on Rods \$34.50, both prices having been shaded in bidding for pending business. The demand for Rods in 100 to 300 ton lots is strong and increasing.

Rails and Track Supplies.—A fair tonnage in lots of 1000 to 3000 tons was booked during the week at prices ranging from \$31.50 to \$32 for near-by delivery and \$31 for September or later. Light Rails are in good demand. Buyers are hurrying up deliveries on orders placed early in the season. The prospect that there will be several more elevated roads in this city before many months has aroused the expectations of Rail makers. Splice Bars continue to be quoted at 1.70¢ @ 1.72½¢; Iron or Steel Spikes at 2.10¢ @ 2.15¢; Hexagon Nut Track Bolts, 2.65¢, and Square, 2.55¢.

Plates, Tubes, &c.—The demand for Plates is very light. The situation between boiler makers and their employees is unchanged. No conference has taken place, and so far as can be learned no overtures have been made by either party. Prices are unchanged on such business as is doing. The market for Tubes is also quiet and prices weak; 2½-inch and smaller are now quoted at 60 % off.

Sheets.—The demand for Black Sheets is increasing. It is noted that many buyers are trying to have stocks delivered before July 1, on the prospect of a shut down by mills after that date. Manufacturers, as a rule, are quoting 2.75¢ on No. 27 at mill for Iron, and 2.85¢ for Steel. Some makers are asking 5¢ advance, and others 5¢ less than these figures. There is a strong feeling in the Galvanized market, and an improvement in the demand. Makers are getting 70 and 5 % on Juniata at mill, and jobbers quote same brand at 70 % off from store.

Merchant Steel.—A very fair and steady demand is reported for Tool Steels, with satisfactory prospects of its continuation; Buyers of Soft Steel Bars and other

shapes are still withholding their orders. Implement manufacturers are not now in the market, and report that they will wait until this year's crops can be gauged to better advantage. It is rumored that a combination has been formed among the leading manufacturers of Springs for wagons, carriages, &c., and that the buying of material for associated makers will be done by one person. We continue the following quotations: Ordinary Tool Steels are quoted at 6¼¢ @ 8¢; Specials, 13¢ @ 25¢; Open-Hearth Spring Steels, 2¢ @ 2¼¢; Crucible Spring Steel, 3¼¢ @ 4¢; Machinery, 4¼¢ @ 5¢ for the best quality.

Wrought Iron Pipe.—The demand continues quite heavy, and mills show some anxiety to obtain orders. It is likely that buyers of round lots could shade the following prices, which are given as mill shipments, freight allowance to Chicago: Black, 1½ inch and larger, 70, 10 and 5 %; the same, Galvanized, 60, 10 and 5 %; Black, 1½ inches and smaller, 60, 10 and 5 %; same sizes, Galvanized, 50, 10 and 5 %.

Old Rails and Wheels.—Nothing has occurred to alter the situation the past week. The market for all old material is dull. Wheels are nominally quoted at \$15; Old Iron Rails at \$18 @ \$19; Old Steel Rails at \$12.50 @ \$13.

Scrap.—Lately dealers have been hunting for buyers, but with very little success. Consumers apparently do not want the stuff and if they did they could buy it on very reasonable terms. Prices quoted give only an approximate value. Sales of several hundred tons were made during the week by railroads at less than quoted prices, where storage room was in demand. We make the following quotations as dealers' nominal prices per net ton, f.o.b. Chicago: No. 1 Railroad, \$16; No. 1 Forge, \$15; No. 1 Mill, \$10.50; Pipes, \$10; Cast Borings, \$6.50; Wrought Turnings, \$9; Axle Turnings, \$11; Heavy Cast, \$11.50; Stove Plate, \$8.50; Malleable Cast, \$10; Horse Shoes, \$16; Fish Plates, \$18; Mixed Steel, gross ton, \$10 @ \$11; Coil Steel, \$14.50; Leaf Steel, \$15.50; Locomotive Tires, \$15.

Metals.—Spelter is held quite firm at 4.75¢ @ 4.80¢ and in good request. Casting brands Copper are in good demand at 11.75¢, and Ingot Copper at 11.95¢ @ 12¢. There is a very fair demand for Pig Lead at 4.12½¢ @ 4.15¢, and in carload lots 4.35¢.

Copeland & Bacon, builders of hoisting engines and mining plants, of 85 Liberty street, New York, and 535 Arch street, Philadelphia, have opened a store at 62 South Canal street, Chicago.

Cincinnati.

(By Telegraph.)

Office of The Iron Age, Fourth and Main Sts.,
CINCINNATI, May 18, 1892.

There has been a fair volume of consumptive trade in Pig Iron during the week, but no large buying to swell the transactions to unusual proportions. The trade has been disturbed by rumors of sales at lower prices, but there is no confirmation of them, but, on the contrary, a flat denial. In many instances it is known that factors stand ready to take considerable quantities of Iron at better prices than it has been rumored it sold for and they have made bids only a little below the asking rates, only to be refused. The Southern furnaces, as a rule, are in different about selling unless they obtain full figures, and there is enough business in progress to give a decidedly firmer undertone to the market. As confirming what we said last week regarding the revolution in progress, in the methods of doing Pig Iron business, it has transpired that factors

have bought several large lots direct from furnaces. There is no quotable change in prices of Southern Coke Iron, but there is a fair volume of business at quotations, while Charcoal Car Wheel Iron meets a demand in excess of the supply, but higher prices have not yet been realized. Quotations are as follows:

Foundry.		
Southern Coke, No. 1.....	\$13.75 @	\$14.00
Southern Coke, No. 2.....	12.75 @	13.00
Southern Coke, No. 3.....	12.25 @	12.50
Ohio Soft Stone Coal, No. 1.....	16.00 @	16.50
Ohio Soft Stone Coal, No. 2.....	15.50 @	15.50
Mahoning and Shenango Valley.....	15.61 @	17.25
Hanzburg Rock Charcoal, No. 1.....	19.75 @	20.00
Hanzburg Rock Charcoal, No. 2.....	19.00 @	19.50
Tennessee and Alabama Charcoal, No. 1.....	16.50 @	17.00
Tennessee and Alabama Charcoal, No. 2.....	15.50 @	16.00
Forge.		
Gray Forge.....	11.75 @	12.00
Mottled Neutral Coke.....	11.25 @	11.50
Car Wheel and Malleable Irons.		
Standard Southern Car Wheel.....	18.75 @	19.00
Lake Superior Car Wheel and Malleable.....	17.75 @	18.00

St. Louis.

Office of The Iron Age,
Bank of Commerce Building,
ST. LOUIS, May 16, 1892.

Pig Iron.—The market has relapsed into a condition bordering on dullness. Consumers are buying sparingly, and large trades are very scarce indeed. Furnacemen have apparently concluded that the market is not in a condition to stand much pressure, and are not pushing sales as vigorously as they were a few weeks since. The one bright feature in the gloom is the probable combination of the Tennessee and De Bardeleben companies, which now seems assured. The market is now, and has been for six months, in a condition that sadly needs a directing hand to pilot it through the depressing period which seems destined to continue for some time yet. The combination referred to can practically control a large percentage of the production of the Southern furnaces, and while much higher prices are not anticipated, the decline will no doubt be checked, and the confidence of consumers restored, which will be a point gained that will work material advantages all along the line. Sales during the week under review have been light, and prices as quoted herewith have been, generally speaking, adhered to. We quote as follows, cash, f.o.b. St. Louis.

Southern Coke, No. 1 Foundry.....	\$14.00 @	\$14.25
Southern Coke, No. 2 Foundry.....	13.25 @	13.75
Southern Coke, No. 3 Foundry.....	12.00 @	13.00
Gray Forge.....	12.25 @	12.50
Southern Charcoal, No. 1 Foundry.....	16.25 @	16.75
Southern Charcoal, No. 2 Foundry.....	15.50 @	16.00
Missouri Charcoal, No. 1 Foundry.....	14.50 @	15.00
Missouri Charcoal, No. 2 Foundry.....	14.00 @	14.25
Ohio Softeners.....	17.00 @	17.25

Bar Iron.—The movement in Bar Iron has been limited. Jobbers are fairly busy, but mills are complaining for want of orders. Prices are in a peculiar condition. It depends largely on the specifications what prices mills will quote. Some are short of some sizes and are asking full prices, while others with large stocks of certain sizes on hand are willing to quote inside prices. The market so far as prices are concerned is unsettled. A fair average quotation for lots from mill is 1.60¢ half extras, f.o.b. cars East St. Louis. Lots from store command 1.65¢ @ 1.70¢, according to quantity.

Barb Wire.—As was expected, trade has fallen off since our last report, caused largely by the restoration of freight rates to Texas points. A fair business is being transacted, however, at the following prices: Painted, \$2.35 @ \$2.40; Galvanized, \$2.80 @ \$2.85, less than car lots 10¢ ¾ cwt. additional.

Wire Nails.—If anything Wire Nails are weaker than they were one week since.

Mills are now quoting \$1.80 for any quantity whatever, their object evidently being to reach the bottom at once rather than work down gradually. It is pretty generally admitted that at the price plain Wire is now selling Wire Nails cannot be sold at less than price quoted above and a profit made from the sale. Indications point to a lower range of prices, however, and unless the demand shows a decided improvement in the next few days lower quotations will doubtless prevail.

(By Telegraph.)

Pig Lead.—The market is practically the same as last reported. There is no improvement in the demand and prices remain unchanged; for May and June delivery 4.05¢ @ 4.07½¢ is quoted, large lots being accepted at the inside figure.

Spelter.—This metal has relapsed into a state of extreme dullness. There is an undertone of strength, which is indicated by the fact that 4.65¢ continues to be the price, in the face of the fact that there is practically no demand. It is reasonable to suppose that higher prices will be in order at the first indication of an increased demand. Stocks are light and furnacemen are not running very fully, which is of material assistance to the market at this time.

Adolph Butze, who occupied the position of manager for Ezra Linley, St. Louis, has opened an office in the Bank of Commerce Building, and will transact a regular brokerage business. Mr. Butze, before assuming his connection with Ezra Linley, held for some years a responsible position with a leading railroad, and is thoroughly familiar with this line of trade. He is at present representing the following well-known houses: The Adams & Westlake Company, Chicago Tire and Spring Company, Olmstead & Tuttle Waste Company, the Upson Nut Company and United Rubber Company. We are advised that Mr. Butze is in position to handle additional lines, and would be pleased to hear from manufacturers desiring representatives in St. Louis and vicinity.

Louisville.

LOUISVILLE, KY., May 16, 1892.

The same dullness continues in the market that has existed for some weeks, consumers buying only what Iron they desire for immediate consumption, and not feeling disposed to buy for long deliveries, save at inside quotations, feeling from their past experience that any purchase they may make they will be able to duplicate or to obtain for less before all the Iron is delivered. As this policy has been followed for a long period with heavy consumption going on and with consumers drawing upon Iron in their own yards, it will not be surprising if a marked change for the better should occur unexpectedly. At present, however, there is no indication of higher prices, and Iron is being offered on the market by weak holders who have lost confidence in the situation, at prices that are below open quotations.

Southern Irons are meeting sharp competition among the Virginia furnaces, who are offering Iron at Baltimore 50¢ per ton below prices that Southern furnaces will sell at, and are also making deliveries throughout the year. Fortunately, it is not necessary for Southern Irons to meet these figures to sell a fair portion, as they are needed for a mixture even at an advanced price. We quote for cash, cars, Louisville:

Southern Coke, No. 1 Foundry... \$13.75 @ \$14.25
Southern Coke, No. 2 Foundry... 12.75 @ 13.25

Southern Coke, No. 3 Foundry... 12.00 @ 12.50
Southern Coke, Gray Forge... 11.50 @ 12.00
Southern Charcoal, No. 1 Foundry... 15.75 @ 16.75
Southern Car Wheel, standard brands... 18.00 @ 19.00

Detroit.

WILLIAM F. JARVIS & Co. of Detroit, Mich., report under date of May 16, 1892, as follows: There has been more activity in Lake Superior Charcoal, several large deals having been closed for delivery during the present season of navigation, and a number of buyers are still in the market. Present indications are that the heavy buying of this grade of metal will be done during May and June, which is from a month to six weeks earlier than usual. While the volume is satisfactory, the figures obtained are disappointing to the manufacturers. It is hardly to be expected that better prices can be hoped for until the majority of the large buyers have satisfied their wants. While there is a preference shown for certain favorite brands, yet buyers are unwilling to pay very much of a premium to obtain them. Usually when prices are fairly high buyers will freely pay 50¢ and sometimes even \$1 per ton extra to secure the Irons they are accustomed to use, but when prices are very low 50¢ seems a great difference and sometimes even 25¢ per ton will cause them to experiment.

Coke Irons are very quiet and prices continue weak, and an order for 100 or 200 tons is sought after with as great eagerness as a 1000-ton order would be ordinarily.

With a dull market, Lake Superior Charcoal being the only exception, we quote as follows:

Lake Superior Charcoal, all numbers... \$16.50 @ \$17.50
Lake Superior Coke, Bessemer... 16.00 @ 17.00
Lake Superior Coke Foundry, all ore... 16.50 @ 17.00
Ohio Blackband (40 per cent)... 17.00 @ 17.50
Southern No. 2... 15.00 @ 15.50
Southern Gray Forge... 13.25 @ 13.75
Jackson County (Ohio) Silvery... 17.75 @ 18.25

Pittsburgh.

Office of The Iron Age, Hamilton Building, Pittsburgh, May 17, 1892.

Inquiries during the week under review were quite numerous, and while no large gain in sales over previous weeks can be recorded, the outlook for the balance of May is good, as several large deals are pending, which may be closed any day. It is the belief of many that if a general buying movement once sets in it will have the effect of preventing any further decline in prices. In some lines of finished material, such as Steel Plates, Wire Rods, Plain and Barb Wire and Wrought-Iron Pipe, the improvement in demand is particularly noticeable. Summing up the situation as a whole, it can be stated that the outlook is a little better as far as demand is concerned, but any advance in prices, for some time at least, cannot be expected.

Pig Iron.—The week under review showed an improvement over the preceding one, both in inquiries and sales, but particularly the former. As we state above, deals are pending, involving a good many thousand tons, and some of them will undoubtedly go through before the month is out. The price of Pig Iron has got down to such a point that a difference of a few cents per ton between buyer and seller will keep the deal hanging fire for some time. Brokers state that it is harder to do business now than it is when prices are higher and a fair profit is being realized by the furnace. It is very evident from the hand-to-mouth buying that has been going on for some time that stocks in consumers' hands are pretty low and that when prices have reached that point when buyers will feel safe in placing their

orders for future wants there will be a large amount of Iron change hands. We have in mind three or four concerns that use a very respectable amount of Pig Iron every month, and none of them will buy more than 100 or 200 tons at a time, for fear there will be a drop in price before they could use up larger quantities. Since our last report another stack in the Shenango Valley has been blown out and the Roney & Berger Iron Company at New Castle, Pa., contemplate making some extensive improvements at their stack, which will, of course, necessitate the suspension of operations while these are being made. Three stoves will be added and the furnace will receive a general overhauling. The regular monthly report of the Western Pig Iron Association for May has just been issued, from which we learn that stocks of Coke Iron on May 1 showed an increase of only 5000 tons over those of April 1. While we would be glad to know that consumption of Pig Iron made from Coke had almost caught up with production, we very much fear that if the truth were known stocks have increased several times the amount stated above. Prices for the past week do not show much change and Bessemer seems to have settled down to \$14.25 for close delivery. For small lots, ranging from 100 to 500 tons, 10¢ @ 15¢ additional over this price is obtained. A fair demand is going for Mill Iron, while there is very little doing in Foundry. We quote prices as follows:

Neutral Gray Forge... \$12.75 @ \$12.85, cash
White and Mottled... 12.50 @ 13.00, "
All-Ore Mill... 13.25 @ 13.50, "
No. 1 Foundry... 14.50 @ 14.75, "
No. 2 Foundry... 13.75 @ 14.00, "
Bessemer Iron... 14.25 @ 14.40, "
Warm-Blast Charcoal... 18.50 @ 20.00, "
Cold-Blast Charcoal... 25.00 @ 27.00, "

Reports are going that \$14.25 for Bessemer has been shaded in several instances but diligent inquiry failed to verify them. We are reported a sale of a large block of Bessemer, aggregating about 10,000 tons at \$14.25, equal deliveries in May, June and July. Also a sale of 2000 tons for delivery in June and July at \$14.40, delivered.

Ferromanganese.—There is a fair demand for domestic, which continues to bring \$62 @ \$62.25. We are not advised of any foreign being sold here since our last report.

Soft Steel Billets.—There is very little change to note and the price seems to have settled down to \$22.50 for deliveries within the next three months. For large lots this price would be shaded considerably, although several makers have declined to take business below that figure. Several large buyers are in the market for Billets, but as yet there is a considerable difference between their views and the makers' as regards prices. One buyer claims to have offers at \$22.25, but is holding off for lower figures, and seems confident that he can have his order entered at a shade lower than \$22.25. Time will tell which will give way first, the buyer or seller. We quote the market from \$22.35 to \$22.75, with \$22.50 as the ruling figure.

Muck Bar.—The small demand for some months past has caused prices to go off, and we are advised of a sale last week at \$24.75, delivered at buyers' mill. It is claimed that a good order would shade this price.

Structural Material.—Business is increasing, some very fair orders having been placed recently, and additional orders are in sight that will probably be placed before the month is out. The old Beam mill of Carnegie, Phipps & Co., Limited, at Homestead, is being overhauled and some Hanley tables are being added. We repeat quotations of last week, as follows: Beams and Channels on a

basis of 2¢ for desirable orders and 2.10¢ small lots; Angles, 1.85¢ and 1.90¢; Universal Mill Plates, Iron, 1.80¢ @ 1.90¢; Universal Mill Plates, Steel, 1.80¢ @ 1.90¢; Tees, 2.50¢; Refined Iron Bars, 1.70¢; Steel Bars, 1.75¢.

Wire Rods.—The market shows considerable strength, and it is understood that the output of the various Rod mills is fully provided for up to July 1 next. One concern has bought very largely recently, and an advance in prices for Rods for immediate shipment within a short time is not improbable. We quote the market at \$32 @ \$32.50, and note a sale of 3000 tons, 1000 tons for May and 2000 for June, at a price equivalent to \$33.15 on board cars at Pittsburgh.

Steel Plates.—In sympathy with other lines of finished material, there has been an increased business lately, but prices do not show any tendency to advance. Some very large orders have recently been booked by Pittsburgh after severe competition, which necessitated pretty low prices being named. Our mills here are better fixed for business now than they have been for a long time. We quote prices as follows: Fire Box, 3.50¢ @ 4¢; Flange, 2.15¢ @ 2.25¢; Shell, 2¢ @ 2.10¢; Tank, 1.85¢ @ 1.90¢.

Steel Rails.—There is no change to note, the local mills running on orders booked some time ago. The report that the Edgar Thomson mill had turned out 2163 Rails in eight hours on last Saturday is without foundation. It is reported here that the Cleveland Rolling Mill Company will start up their mill before this month is out, as they have some orders booked which must be filled. Prices remain at \$30, f.o.b. at mill.

Merchant Steel.—The severe floods in the West are having their effect on business here, and trade for the past week or ten days has been quiet. Considerable business is in sight, however, and manufacturers are very hopeful of the future. The reputation of the product of some of the Steel mills of Pittsburgh is such that they do not seem to lack for business, but continue to run full all the time, and always obtain the best prices going. We quote as follows: Crucible Spring Steel, 3½¢ @ 4¢; Tool Steel from 6½¢ upward, according to quality, and Bessemer Machinery, Tire and Spring Steel from 2¢ up to 2.40¢, according to quality.

Barb Wire.—The activity among mills making both Plain and Barb Wire is remarkable, and complaints from customers from every section are being received on account of their orders not being shipped fast enough. Work is being pushed rapidly on the new Wire mill of the Pittsburgh Wire Company, at Bradnock, and it is expected to be ready for operations about July 1 next. Plain Wire of all kinds will be made. Prices are unchanged and we quote as follows: \$2.25 @ \$2.30 for Painted, and \$2.70 @ \$2.75 for Galvanized, f.o.b. at factory, the lower prices named being on carload lots.

Wire and Cut Nails.—A very fair business is being done in Wire Nails, and the mills, as a rule, are well fixed with orders. Some very large shipments have recently been made from Pittsburgh to points in the West. Prices are unchanged and we quote at \$1.60 @ \$1.65 in carload lots, and \$1.70 in less quantities. In Cut Nails a moderate business is being done, and several of the Wheeling mills have some very fair orders on hand. We repeat quotations of last week, as follows: \$1.47½ @ \$1.50 for carload lots, 30¢ averages, f.o.b. in Wheeling district.

Wrought-Iron Pipe.—There is nothing new to report. While some of the mills are better fixed with orders than they

have been for some time past, prices do not show any tendency whatever to improve. The mills of the American Tube and Iron Company, located at Youngstown, Ohio, and Middletown, Pa., are both working on an order for 13,000 tons, mention of which we have already made. Discounts are unchanged, and but little or no attention has been paid to them by the makers for months past.

Manufactured Iron.—The situation is much the same as was noted last week. Mills making Bars are all pretty fully employed, the object being to be as well prepared as possible for the usual summer shutdown for repairs, now near at hand. The competition for business, however, is very keen, and, as a result, the customer gets the benefit of it. We could name some mills here whose product has such a high standard that they have no trouble whatever to get their share of the business going, and always at the most favorable prices. Other concerns whose product is not so well known are compelled to name pretty low prices, in order that they may keep running. Prices are unchanged, with the exception of Skelp Iron, which again shows a decline. We quote prices as follows: No. 1 Bars at 1.57½¢ @ 1.60¢, 60 days, 2 ¢ off for cash; Bars made from Old Rails at 1.47½¢ @ 1.50¢; Steel Sheared Plates, 1.85¢ @ 1.95¢; Iron Sheared Plates at 1.80¢ @ 1.90¢; No. 24 Sheet at 2.50¢ @ 2.60¢, 60 days, 2 ¢ off for cash.

Scrap Iron and Steel.—There is no improvement whatever to note either in demand or prices. We have not heard of a sale of either Iron or Steel Scrap of any considerable size for some weeks past. Occasionally a few tons change hands, but such sales do not cut any figure in the market. In the almost entire absence of business we make nominal quotations as follows: No. 1 Railroad Wrought Scrap, \$16.75 ¢ net ton; Cast Scrap, \$12 ¢ gross ton; Billet and Bloom Ends, \$16.75 @ \$17; Cast Iron Borings, \$9 @ \$9.25 ¢ gross ton; Mixed Country Steel, \$14 ¢ gross ton; Railroad Coil Springs, \$18 @ \$18.25 ¢ gross ton; Leaf Springs, \$20 ¢ gross ton.

Old Rails.—For the first time in some weeks we are advised of a sale of Old Iron Rails, the amount given 1000 tons, at a price not made public. They were for shipment to a point west of Pittsburgh. In Old Steel Rails we are not advised of any transactions since our last report and make nominal quotations as follows: Short lengths Old Steel Rails under 6 feet which do not require sorting, at \$16; miscellaneous lengths are held at \$15.50, and long lengths \$16.25 @ \$16.50; Old Iron Rails may be quoted at \$21, delivered in the Mahoning Valley.

Railway Track Supplies.—Mills making Rail Fastenings seem to have the best of the situation as far as business is concerned, and a general activity among all the mills making this kind of material is reported. Prices do not show any change, and we quote as follows: Spikes of standard size, 2.15¢, 30 days; Iron Splice Bars, standard sections, 1.75¢ @ 1.80¢; Steel Splice Bars, 1.80¢ @ 1.90¢; Track Bolts, 2.70¢ with Square and 2.80¢ with Hexagon Nuts, cash 30 days, f. o. b. at Pittsburgh.

Cleveland.

CLEVELAND, OHIO, May 16, 1892.

Iron Ore.—During the past week 37,886 tons of Ore have been received at this port as against 352 tons during a corresponding period in 1891. A little more has actually been sold than for a few weeks previous, but the trading, after all, has not been what might be termed live

and active. This, at least, shows that a very fair start has been made toward getting down new Ore for this year, especially as compared with the same time last year. There is but little doubt, too, that the receipts at the port would have been larger had not a strike among the Ore handlers seemed imminent. The shipments of Ore to the furnaces continue at a good pace. During the past week 24,761 tons were moved, as against 3584 tons during a similar period last year. The vessel owners who entered the compact last week to hold out for a 50¢ rate on coal to Lake Superior ports were jubilant to-day. Their action is liable to improve business and hurry the shipment of Ore to Ohio ports. It is claimed that the advance is due altogether to the action of the owners last week in agreeing to refuse all offers less than 50¢. Tonnage was in demand, and boats were going up light in preference to accepting charters below this rate. Quite a number of coal charters at this figure were made during this afternoon. The Ore situation Monday morning was strong at last week's rates, although no charters were reported. Ore vessels are commencing to arrive in greater numbers now than at any time since the season opened, and from present indications the coming week will show a big increase in receipts. At this writing there are several boats at the Cleveland and Pittsburgh and Nypano docks waiting to be relieved of their cargoes. At present the rate of bringing Ore from Escanaba is 75¢, and from Ashland and Two Harbors \$1.15 @ \$1.25. Quotations for Ore here are as follows:

Red Hematite Ores, Bessemer quality.....	\$4.25 @ \$4.50
Red Hematite Ores, Non-Bessemer quality.....	3.50 @ 4.00
No. 1 Specular and Magnetic Ores, Bessemer quality.....	5.00 @ 6.00
No. 1 Specular and Magnetic Ores, Non-Bessemer quality.....	4.25 @ 4.75

Pig Iron.—The Pig Iron market is as dormant as ever, and there is no indication of any immediate change for the better. A few small amounts, perhaps, have been sold, but the total amount is insignificant when compared with the product making and on hand. The effort for curtailment of production continues. All the big furnaces, in which Cleveland capital is represented, are reported banked down, and some have gone out of blast. Word comes from the Shenango Valley that furnaces there are doing likewise. A general movement of this kind would undoubtedly have a tendency to bring about a decided change in the general condition of the market. Quotations are:

Nos. 1 to 6 Lake Superior Charcoal	\$17.50 @ \$18.00
Nos. 1, 2 and 3 Bessemer, per ton.....	15.00 @ 15.25
No. 1 Strong Foundry, per ton.....	15.00 @ 15.50
No. 2 Strong Foundry, per ton.....	14.00 @ 14.50
No. 1 American Scotch, per ton.....	15.00 @ 15.60
No. 2 American Scotch, per ton.....	14.00 @ 14.60
No. 1 Soft Silvery, per ton.....	15.50 @ 16.50
Mahoning and Shenango Valley Neutral Mill Irons, per ton.....	13.50 @ 14.00
Mahoning and Shenango Valley Red Short Mills, per ton.....	14.00 @ 14.50

Nails.—The market the past week has been easy and lower. Steel Wire Nails are quoted at \$1.70, and Steel Cut Nails bring \$1.65 in stock.

Wire.—Barb Fence Wire is still scarce and the market very strong. The mills are all occupied though, and the demand continues excellent. Bright and Annealed Wire is a shade lower in price.

Old Rails.—The market continues dull, with an occasional transaction in Old Americans at \$19 @ \$19.50.

Scrap Iron.—Business in the Scrap Iron market the past week was exceedingly dull. No. 1 Railroad Wrought is quoted at \$17 @ \$17.50; Cast Scrap at \$12, and Steel Rails and Bloom Ends at \$15.75 @ \$16.

New York.

Office of *The Iron Age*, 96-102 Reade street, 1
NEW YORK, May 18, 1892.

Pig Iron.—Dealers generally report a continuance of the dullness so long existing. A few sales ranging from 500 to 1500 tons have transpired, however, and they give rise to the hope that other consumers may also find it necessary or desirable to enter the market. There is some pressure to sell by makers of inferior brands or holders of stocks on which they wish to realize, but standard brands are being held firmly, offers of a shade under asking prices being refused. The fact is well established that with the latter there is a steady reduction in stocks now being made every week. Consumption thus seems to be gaining. Reports from foundrymen indicate that with the exception of jobbing foundries and architectural works they are well employed, and melting about as much iron as usual, if not more. We quote Northern brands at \$15.50 @ \$16 for No. 1; \$14.75 @ \$15 for No. 2; \$13.50 @ \$14 for Gray Forge, tidewater. Southern Iron, same delivery, \$15 @ \$15.50 for No. 1; \$14 @ \$14.50 for No. 2 and No. 1 Soft; \$13.25 @ \$13.50 for No. 2 Soft; \$13 for Gray Forge.

Spiegeleisen and Ferromanganese.—No transactions are reported. Quotations continue at \$23 @ \$23.50 for 10 to 12 %, \$26.50 @ \$27 for 20 % Spiegeleisen, and \$61 @ \$61.50 for Ferro.

Billets and Rods.—The reduction in East-bound freight rates is reported likely to be reconsidered and restored to the 25¢ basis, Chicago to New York. The only business now being done in Billets is in special qualities, which command special prices. Ordinary 4 by 4 inches are nominally worth \$25.50 @ \$26, tidewater. Wire Rods are quiet and quoted at \$35.

Steel Rails.—Business has been very dull the past week, but prices are continued at \$30 at mill, or \$30.75, tidewater.

Manufactured Iron and Steel.—Structural material is the only line showing any life. Good orders are being received for Beams, Sheared Plates, Universal Plates and Angles, ranging from 100 to 1000 tons. The building season opened late, but seems to be making up for its tardiness now. More large building projects are now taking definite shape. Manufactured Iron and Steel in general have been quiet. The Plate mills are inclined to be a little firmer. Nominal prices, subject to concessions on good specifications, are as follows: Beams, 2.40¢ @ 2.45¢ for small lots and 2.20¢ @ 2.30¢ for round lots; Angles, 1.9¢ @ 2¢; Sheared Plates, 1.85¢ @ 2.25¢; Tees, 2.40¢ @ 2.75¢; Channels, 2.25¢ @ 2.50¢, on dock. Car Truck Channels, 2¢ @ 2.10¢. Steel Plates are 1.85¢ @ 1.95¢ for Tank; 2.05¢ @ 2.25¢ for Shell; 2.35¢ @ 2.65¢ for Flange; 2.55¢ @ 2.75¢ for Marine, and 3¢ @ 3.25¢ for Fire Box, on dock. Bars are 1.7¢ @ 1.9¢, on dock. Scrap Axles are quotable at 2¢ @ 2.10¢, delivered. Steel Axles, 2¢ @ 2.1¢, and Links and Pins, 2.05¢ @ 2.20¢; Steel Hoops, 1.9¢ @ 2¢, delivered.

Merchant Steel.—Quotations are continued—namely: Hot-Rolled Shafting, 1.90¢ @ 2¢; Machinery, 1.90¢ @ 2.10¢; Tire, 2¢ @ 2.25¢; Toe Calk, 2.20¢ @ 2.35¢, and Tool Steel, 5½¢ @ 6½¢, delivered.

Track Material.—Trade in this line sympathizes with Steel Rails, and is therefore very quiet. Spikes are quoted at 2¢ @ 2.05¢; Fish Plates, angle or plain, 1.60¢ @ 1.70¢; Track Bolts, square nuts, 2.65¢ @ 2.75¢, and hexagon nuts, 2.80¢ @ 2.85¢.

Old Material.—A lot of 800 tons of Old American Iron Rails was sold at \$17.50 at a Sound port. This is the lowest price known here for many years. Of Old Steel Rails a sale of 500 tons was made at \$16, delivered at buyer's mill in Pennsylvania. No. 1 Wrought Scrap is quoted at \$17, delivered to lighter.

The Pulaski Development Company of Pulaski, Va., announce that they have arranged with Crocker Brothers, 32 Cliff street, New York, to act as sole agents for the sale of their Dora Iron, made at their furnace in Pulaski.

W. de L. Benedict has removed his office to the Welles Building, 18 Broadway, rooms 617 and 618, New York.

George H. Ismon, 54 Warren street, New York, has been appointed Eastern sales agent for the Falcon Iron and Nail Company of Niles, Ohio, manufacturers of steel and iron sheets, black and galvanized iron, and skelp iron. He has further been appointed Eastern sales agent for the Youngstown Iron and Steel Company, manufacturers of bars, bands, hoops and special shapes of iron and steel. The latter company will shortly have a very complete catalogue ready for issue, which includes the Eastern bar iron classification and cuts of special sheets for which they have rolls. Mr. Ismon also represents the Salem Wire Nail Company, at the above address, where he carries a complete stock of wire nails.

Metal Market.

Copper.—The situation of the Copper market is practically the same as it was a week ago. The opening of navigation found comparatively little Copper on dock awaiting shipment, as more than the usual quantity had been sent overland during the winter and spring months to meet consumptive requirements. Hence the looked-for May decline in prices has failed to materialize. In its place a steady market is to be noted, with good general distribution into the channels of consumption. New transactions in Lake Superior Ingot have not been large during the week, yet fair and chiefly at 12¢ @ 12½¢, as to size of parcel. Wire Bars have fared relatively better. Upward of 250,000 lb were placed at 12½¢ for June and July delivery and 12½¢ is now asked. Casting Copper has met with merely fair sale and prices have remained stationary at 11½¢ @ 11¾¢, as to brand and quantity. James Lewis & Sons' circular of May 2, says: "The negotiations between the American and European producers proceed in a very dilatory fashion. The latter have, however, at last agreed to reduce their production below that of last year, and as it is so manifestly the interest of those concerned to enhance the value of Copper by placing a limit on the quantity to be produced, there is little doubt that in course of time an International agreement will be concluded. Meanwhile the trade here are very incredulous as to a satisfactory result being arrived at. Lake Ingots are held in the American market for 12¢ and Arizona Ingots for 11¾¢, which has allowed of 175 tons Arizona Bars being reshipped from here to New York, and we understand more are to follow."

Pig Tin.—In a speculative way fully 600 tons have changed hands in this market during the past week and prices show an advance of 30¢ @ 35¢ @ 100 pounds on both prompt and future deliveries. A good business with jobbers and consumers has also been effected, and the transfer of supplies from the English market to this side of the Atlantic thus far seems to have assisted rather than hampered the "bull" interest in their efforts to establish higher

prices. Light shipments from the Straits have also been an assistance, the total April movement having been only 2275 tons, or hardly a month's consumption, while the returns for the first half of May give but 875 tons for Great Britain and America and 50 tons for the Continent. Arrivals here have been heavy but well taken care of, and the market is apparently stronger now at 20.85¢ net, cash, for 10-ton lots than it was a week ago at 20.55¢. Deliveries running for a series of months and up to the close of the year have been taken at 20¼¢ @ 21¢, in lots of 10 to 25 tons per month, and July, August and September separately brought 21¢, all of which would indicate confidence in the future on the part of some operators.

Pig Lead.—Consumers have taken about 500 tons, in fair-sized lots, at 4.22½¢ @ 4¼¢, and single carloads have realized 4.27½¢ @ 4.30¢. The Idaho mining troubles cause a scarcity of Ores in some quarters that is rather threatening, and late accumulations of Pig Lead, it is reported, have been cut down considerably, so that the surroundings look favorable for a strong market. Extreme reserve manifested by consumers operates as an offset to the strong position, however; hence absence of any radical turn in values and lack of speculative interest in the market. In the foreign markets there has been no changes; heavy supplies there keep prices low.

Spelter.—Some modification of prices of Western brands have been made by smelters, presumably because of inability to effect business of any considerable volume at the high rates asked of late, but the concession has thus far failed to stimulate business, and the market is slow as well as easier. Spot parcels of prime Western might bring 4.85¢, but near future shipment is offered at 4.80¢ and bids of 4¼¢ have been solicited.

Antimony.—Of ordinary jobbing quantities there has been about the usual movement, but business otherwise has continued slow and prices have undergone little change. Current quotations are 11½¢ @ 11¾¢ for Hallett's, 12¢ @ 12½¢ for LX, 12½¢ for Crown and 14½¢ @ 14¾¢ for Cookson's, as to size of lot.

Tin Plate.—A very fair business has been done in light-weight Plates for future delivery and some improvement is noted also in sales of full weights, the whole serving to give the market rather more tone. Spot business is without visible improvement, however, and chiefly at old prices. Recent liberal arrivals afford a more ample and better assorted spot supply. The import movement is now of normal proportions and promises to be so for some little time to come. We quote as follows for full weights: Coke Tins—Penlan grade, IC, 14 x 20, \$5.25; J. B. grade, do., \$5.35; Bessemer do., \$5.30; light weights, 100 lb, 10¢ less; 95-lb, 20¢ less; 90-lb, 30¢ less than full weight; Siemens Steel, \$5.37½. Stamping Plates—Bessemer Steel, Coke finish, IC basis, \$5.60 @ \$5.65; Siemens Steel, IC basis, \$5.75 @ \$5.80; IX basis, \$6.80. IC Charcoals—Melyn grade, ½ X, \$6.40; for each additional X add \$1.50; Allaway grade, \$5.75; Grange grade, \$5.85; for each additional X add \$1.20. Charcoal Ternes—Worcester, 14 x 20, \$5.75; do., 20 x 28, \$11.30; M. F., 14 x 20, \$7.37½; do., 20 x 28, \$14.75; Dean, 14 x 20, \$5.45; do., 20 x 28, scarce; D. R. D. grade, 14 x 20, \$5.35; do., 20 x 28, \$10.30; Mansel, 14 x 20, scarce; do., 20 x 28, \$10.45; Alyn, 14 x 20, \$5.45; do., 20 x 28, \$10.60; Dyffryn, 14 x 20, \$5.65; do., 20 x 28, \$10.90. Wasters—S. T. P. grade, 14 x 20, scarce; do., 20 x 28, \$10; Abercarne grade, 14 x 20, scarce; do., 20 x 28, \$9.80.

Financial.

Destructive floods in the West and South have excited much apprehension, but it may be questioned whether the aggregate loss occasioned will not be more than made good by the increased productiveness of the soil throughout a wide extent of territory. The Government report on the condition of crops on May 1, showing an improvement of nearly 3% in wheat, was regarded as very favorable, and meteorological events since that date encourage the hope of continued advance. The disturbance of industry by troubles beginning with the granite cutters bodes no good, especially as the services of the New York Board of Arbitration have been rejected, but the Massachusetts State Board, who enjoy a good repute, may secure an adjustment. For the time being at least 50,000 men are reported idle and many important building projects are suspended. A surfeit of money exists at all large business centers. The New York bank statement shows a further piling up of unemployed capital at this point, and a reduction of nearly \$2,000,000 in the loans is further evidence of the disposition to refrain from new enterprises or speculative ventures. In Buffalo the savings banks withdrew over \$1,000,000 in deposits from the commercial banks in that city on being notified that hereafter they would be allowed only 3% interest, instead of 4%. In reference to the official announcement that England will take part in an international silver conference, the *London Times* says: "We regret the course the Government has taken. It appears to be playing into the hands of the politicians in power in Washington. If it were possible by the protocols of a conference to establish a permanent parity between gold and silver, the object would be worth effort and sacrifice; but it is as impracticable as it is for a pint to hold a quart. . . . We can at least be careful not to go beyond the manifestly narrowly defined boundaries of safety." Remark on the same subject, the *London Statist* says: "The adoption of the two standards of value in this country is just as impossible to-day as it was before the vote. Bimetallism will not be adopted, because this country will not change its monetary system. It is the great creditor country of the world. It has lent to other nations immense sums which are payable, capital and interest, in gold, and it will not risk the complete fulfillment of the contracts it has entered into by introducing any other standard than gold. And if this country will not adopt bimetallism neither will Germany, and the whole thing, therefore, falls to the ground."

In New York silver bullion certificates advanced on the diminution of visible supply and prospects of a conference. Thus far this year a net amount of silver has been exported from this country valued at \$8,434,778.

Stocks were stimulated early in the week by purchases on London account, but relapsed into professional trading. Western floods, which interrupted transportation, and the somewhat unsatisfactory proceedings of the Advisory Board in this city, operated as a damper. The new alliance of the Buffalo, Rochester and Pittsburgh Railroad with the New York Central, Beech Creek and Reading Railroads was supposed to strengthen the Reading-Lehigh-Valley-Jersey-Central combination. The demand for good investment securities and dividend paying stocks continues. The news that England had accepted the invitation for an international monetary conference, and the report that this would be followed by the acceptance of the invitation by the principal Continental countries, appeared to stimulate a movement in silver bullion

certificates at higher prices. The break in Rock Island was caused by the statement that nearly \$2,000,000 5% bonds will be issued on the Gulf extension of the road.

Manhattan was firmly held on a report that the Broadway Cable Company had bid a high price for the control of the stock, but this was subsequently denied. Sales were about one-third larger than during the previous week. The preferred stock of the Herring-Hall-Marvin Company was oversubscribed.

Comptroller of the Currency Lacey will resign and go to Chicago to assume the presidency of the Bankers' National Bank.

While the exports of the great leading products continue larger than in former years, the volume and value are decreasing as compared with the preceding months this year, as will be seen by the following figures of the values of breadstuffs, provisions (including live animals), cotton and petroleum in April, as compared with March:

	March, 1892.	April, 1892.
Breadstuffs.....	\$23,072,442	\$19,905,717
Provisions.....	15,198,757	14,106,185
Cotton.....	18,832,497	16,468,886
Petroleum.....	3,153,979	3,859,289
Aggregate.....	\$60,257,675	\$54,340,077

The greatest increase was in wheat, of which the exports for ten months ending April 30, 1892, were \$138,781,231, against exports ending April 30, 1891, of \$36,616,667.

The eastbound lines are not increasing their business to any extent by the reduction of grain rates to the basis of 20¢ to the seaboard, which went into effect on Monday.

British Iron and Metal Markets.

[Special Cable Dispatch to The Iron Age.]

LONDON, WEDNESDAY, May 18, 1892.

Operations in Pig Iron warrants have not increased materially, but higher prices are current all along the line, due chiefly to uncertainties attending the Durham strike, a settlement of which appears to be far off. Continued heavy drafts upon supplies of Iron in public stores also tend to affect the market. The total of Scotch Iron in warrant stores is now 463,000 tons, or 4000 tons less than a week ago, and the amount of Cleveland held there has dropped from 98,000 tons to 88,000 tons. Scotch warrants sold up to 40/10½, Cleveland to 38/11, and Hematite to 48/10. Sales of Spanish Hematite Iron, it is reported, have been made at prices that were current before the strike, for delivery on the East coast.

Pig Tin has advanced about 15%, chiefly under the influence of rather small spot stocks, moderate shipments from the Straits and exports to America. Outside speculation moderate and chiefly in futures.

Copper is firmer. During the latter portion of the week there has been more speculative and freer purchases for consumption, which, together with favorable advices from America and more inquiry from the Continent, restores confidence.

In Tin Plate there has been rather more business, chiefly in Bessemer Cokes and Ternes. Charcoals are neglected. A large demand for Black Plate is noted from Spain, and heavy consignments have been made to avoid the new duty.

Steel Ship Plates are down to £6. 2/6, f.o.b. Barrow, and the market is dull at the decline.

Scotch Pig Iron.—In makers' brands there has been only a fair business and prices are without decided change.

No. 1 Coltness, f.o.b. Glasgow.....	53/6
No. 1 Summerlee, " ".....	52/
No. 1 Gartsherrie, " ".....	51/
No. 1 Langloan, " ".....	51/6
No. 1 Carnbroe, " ".....	44/
No. 1 Shotts, " at Leith.....	52/
No. 1 Glengarnock, " Ardrossan.....	50/6
No. 1 Dalmeilington, " ".....	47/6
No. 1 Eglington, " ".....	47/
Steamer freights, Glasgow to New York, 1/;	
Liverpool to New York, 7/6.	

Cleveland Pig.—A more active business in this line and the market strong at 39/6 for No. 3, f.o.b. Middlesborough.

Bessemer Pig.—Demand is still rather backward, but makers hold firmly for 50/ for West Coast brands, Nos. 1, 2 and 3, f.o.b. shipping port.

Spiegeleisen.—The market remains quiet and without change. English 20% quoted at 77/6, f.o.b. shipping port.

Steel Rails.—No improvement in demand and the market still favors buyers. Heavy sections quoted at £4. 2/6, f.o.b. shipping port.

Steel Blooms.—A moderate business passing at about former prices. Makers quote £4 for 7 x 7, f.o.b. shipping point.

Steel Billets.—No change in these. Business moderate and prices barely steady. Bessemer, 2½ x 2½ inches, quoted at £4. 5/, f.o.b. shipping point.

Steel Slabs.—The market remains very quiet and without change. Bessemer quoted at £4. 5/, f.o.b. at shipping point.

Old Iron Rails.—Demand has fallen off, but holders are asking former prices. Tees quoted at £2. 17/6 and Double Heads at £3, f.o.b.

Scrap Iron.—A moderate business passing, chiefly at former rates. Heavy Wrought Iron quoted at £2. 10/ @ £2. 12/6, f.o.b.

Crop Ends.—Sales moderate, and the market without change. Bessemer quoted at £2. 12/6 @ £2. 15/, f.o.b.

Manufactured Iron.—Business has not improved, and prices are still unsettled, but show no decided change. We quote, f.o.b. Liverpool:

Staff. Ordinary Marked Bars	£ 8 10 0 @	£ 8 10 0
" Common " "	6 30 0 @	6 12 6
Staff. Bl'k Sheet, angles.....	7 16 0 @	
Welsh Bars (f.o.b. Wales)....	5 10 0 @	

Tin Plate.—Market steady at the close, and demand fair. We quote f.o.b. Liverpool:

10 Charcoal, Alloway grade.....	13/9 @ 14/3
10 Bessemer Steel, Coke finish.....	12/3 @ 12/6
10 Siemens " ".....	12/6 @ 12/9
10 Coke, B. V. grade 14 x 20.....	12/3 @ 12/6
Charcoal Ternes, Dean grade.....	11/9 @ 12/

Pig Tin.—Very firm market at the close, particularly for spot stock. Straits quoted at £95. 12/6, spot, and £95. 5/ for three months.

Copper.—Demand fairly active to-day and the market firm. Merchant Bars quoted at £46. 15/, spot, and £47. 2/6, three months' futures. Best selected, £50.

Lead.—A fair business passing and prices steady at £10. 10/ for Soft Spanish.

Spelter.—No change the past week. Business fair and prices steady at £22. 10/ @ £22. 12/6 for ordinary Silesian.

HARDWARE.

Condition of Trade.

IN NEW YORK CITY, representatives of the manufacturers and the jobbing houses generally report an increase in the volume of trade and business is referred to as fairly satisfactory. Manufacturers generally are in a position to fill orders on most lines of goods with reasonable promptness, and are pursuing a conservative course in not manufacturing much beyond the requirements of the trade. The condition of business in other parts of the country is reflected in the special reports following, which indicate, on the whole, a quickened demand for Hardware, which is, however, interfered with, especially in the Southwest, by the heavy rains and floods. Notwithstanding the complaints which are frequently made in regard to the season's business, it is probable that the aggregate of sales will be up to the average, a good deal of the dissatisfaction with business coming from the fact that the more sanguine expectations in regard to an exceptionally heavy business this spring have not been realized. In the matter of prices the market is not in a very satisfactory condition. While on the general line of goods there are no changes to report, in some lines of staple goods prices are weak and lower, and the market as a whole is characterized by a tone which is the reverse of confident and strong. The trade are recognizing this condition of things and are continuing the policy which has distinguished the transactions of the season, of purchasing carefully in small quantities and for their immediate needs. As a result of this stocks in the hands of both jobbers and retailers are lighter than usual. There is little general complaint in regard to collections.

Chicago.

(By Telegraph.)

Jobbers again report that they are having a great many small orders, which aggregate a very satisfactory business. They, however, state that their traveling men uniformly report country roads in such bad condition that it is impracticable to drive empty wagons through the mud, which brings the retail business to a standstill. Country dealers are joyful over the crop prospects, which they say were never better. Notwithstanding this condition of the country, jobbers say their sales for May were larger than for the same period last year. The greater portion of their orders are for shelf goods and seasonable specialties.

St. Louis.

(By Telegraph.)

The movement in Hardware is greatly restricted by the excessive rains, which have caused a rapid rise in the Mississippi and delayed shipments. Nearly every line entering and leaving St. Louis has some portion of its road under water. Some are almost compelled to cease running and are dependent upon competitive roads to enable them to transact business. All this causes more or less disturbance in the Hardware trade, and shipments are unavoidably detained, to the disgust of purchasers. Prices do not change much, but in some lines show an inclination toward a lower rate of values. This is particularly noticeable in Wire and Wire Goods. Builders' Hardware is dull and Shelf Goods are only fairly active. The outlook is not very encouraging, but there may be some improvement in the next few weeks, although it is difficult to see anything in the situation to warrant the expectation.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—There has been a continued activity with the trade during the last two weeks, and at the present writing it is equal in volume to the corresponding time one year ago. Leading goods are in continued active demand; some of the manufacturers have advanced their price 10 per cent. on Poultry Netting and even at this price do not care to enter into small contracts. It is with the greatest difficulty and attention to one's stock of Hardware, at the present time, that one is able to keep it in proper condition. There is a necessity for anticipating one's wants, as manufacturers, as a rule, have no large assortment of stock on hand, and for the jobber to be out of an article means the waiting of some days to have his orders completed. We presume there never was a time when, as a rule, manufacturers have carried less of an assortment of manufactured goods in their warerooms, but depend rather upon their orders to keep their works in operation. There has been a slight lowering in freight rates upon coal to the various distributing points throughout Pennsylvania, which will be to the advantage of some of the interior iron furnaces throughout the State. Now that there has been a little movement in this particular in regard to freights, it is to be hoped that we are a little nearer to correction on freights on Hardware than we were when we began to agitate this matter. Prices continue to rule low, margin of profit small and collections, as a rule, only fair.

Omaha.

LEE-CLARKE-ANDRESEN HARDWARE COMPANY.—Incessant rain has been the order of the day and night since our last report. Business has literally been "un-

der a cloud," and a most disagreeable, damp, depressing cloud at that. This section of the country can ordinarily absorb an immense amount of moisture and be benefited by it, but in this instance we have apparently received too much of a good thing. A few days of pleasant weather, however, goes a long way toward restoring confidence. As the season is so far advanced, and farm work away behind, the arrival of pleasant weather will see farmers busily engaged at work in the fields, where they are likely to remain until the crops are all in the ground. Notwithstanding the unfavorable weather, it is somewhat remarkable, but a fact the same, that the jobbing trade of Omaha are entirely satisfied with the current volume of business, as well as the flattering prospects of the future.

Cleveland.

THE W. BINGHAM COMPANY.—The very heavy rainfall for the past two weeks has had its effect upon trade, but it still can be classed as good, comparing very favorably with a year ago, when the weather was more propitious. The demand still continues to be a varied one, embracing the whole line, which is an encouraging feature. Season goods still cut a figure in most orders. The sale of Lawn Mowers is unprecedented, owing probably to the very low prices which are ruling, in connection with the growing tendency of those who live in the country towns, as well as in cities, to keep the grounds about their place however small, neat and tidy. In staples, the market is the same as in the last report; Cut Nails in little demand, Wire Nails fairly active. The new card of the manufacturers has been adopted, with prices the same as last reported. Plain and Barbed Wire and Poultry Netting in large demand, and mills are very slow in filling orders. Collections are somewhat slower, owing to the poor condition of the country roads. City retailers are busy, Refrigerators, Lawn goods and Builders' Hardware being principally called for.

Louisville.

W. B. BELKNAP & Co.—There is a marked improvement in the demand for heavy goods. A premonition of this was expressed in our last letter. It has so clearly developed as to now demand more decided recognition. The mills seem to be fairly occupied on Iron, Sheet, Wire, Bolts, &c., so that it is difficult to get an order for immediate shipment of any assorted lot executed promptly. This is the result of necessary repairs and additions to working plants all over the country. So far, there is but little new work in sight. The manufacturers are said to be using up their own stores of materials, buying very little pig and other stock. This makes it dull for the furnaces and

agents. All indications point to a closing down of many Bar and Sheet mills in July. Whether there will be much of an adjustment of the wage scale at that time seems doubtful. There is no apparent organization, on one side at least, and what struggles are made will be apparently individual. The continued cold and wet weather, most unseasonable, has doubtless retarded work in both fields and cities. Bricklaying, painting, street reconstruction and so on have been seriously interrupted. With a little encouragement in the way of sunshine we are confident the movement of goods would be satisfactory.

Portland, Ore.

FOSTER & ROBERTSON.—While there has been but little, if any, change in the condition of trade and collections prevailing at the time our last letter was written, yet it may be of interest to give the impressions as to the future gathered in a recent trip over almost the entire territory lying east of the mountains—a territory from which Portland draws a very material portion of her business.

The Kittitas and Yakima valleys, located just east of the cascades, where crops were a partial failure last year, show reasonable promise for this season, although the rainfall has not been sufficient to put the grain beyond danger; still, the fact that many thousands of acres in these two valleys have been placed under irrigation during the past year gives assurances of a fair average crop, even if there should be no further rain. In Adams County, Wash., of which Ritzville is the county seat, a large amount of grain has been sown, and the rainfall has been such as to give promise of a more than average crop. In what is known as the Big Bend country, embracing a goodly portion of Douglass and Lincoln counties, Wash., where there was but from one-fourth to one-half a crop last year, the acreage is much larger than usual, while the indications all point to a very large yield. In Whitman County, Wash., and Latah County, Idaho, comprising what is generally known as the Palouse country, where an entire failure of crops has never been known, the acreage is large and the outlook for a good crop is fully equal to if not better than in previous years. Garfield County, Wash., which is slightly in the dry belt, and on that account subject to occasional failure of crops, promises very much better this year than usual, while Walla Walla County, lying just south of Garfield, with a larger acreage than usual, will fully maintain its record for an excellent yield. In that portion of Oregon lying between Walla Walla and Portland the outlook has never been better and seldom as good as it is at present. Rains have fallen at frequent intervals all through the winter and spring up to within the last few days, which is almost an unparalleled occurrence. From these details it will be seen that the outlook for trade, as a whole, from the territory mentioned is most excellent, and unless something unexpected happens we believe the fall business will be fully equal to if not in excess of previous years.

Prices remain comparatively steady, with very little tendency to cut, except on Gas Pipe, which seems badly demoralized at present. The only change of any importance is a sharp cut in the price of Steel Cut and Wire Nails, which are now sold at figures that will effectively bar all Eastern jobbers from our territory.

San Francisco.

HUNTINGTON - HOPKINS COMPANY.—Since writing our last, prices on Nails and Iron Pipe have somewhat declined, regular market rates on the former being as follows: Iron Cut \$2.25, Steel Cut \$2.35 and Steel Wire \$2.50.

While trade in general has somewhat improved, it is not by any means perfectly satisfactory, and this is true in all lines at present. As the country dealers are doing a good business, however, as a rule, we expect to receive the benefits of their requirements shortly. Local trade in builders' supplies is quiet this month. The remark is often made that a Presidential year is a bad one for business; this old time superstition should not affect California, however, as we are so far removed from the head center of political strife and the country was never in better condition. The prospects for a bountiful crop of fruit and grain are very flattering.

Baltimore.

CARLIN & FULTON.—The situation is about the same as that when last reported. There is, unfortunately, just at present some disturbance in the building trade, the carpenters contending for a working day of eight hours, which a number of contractors are unwilling to concede. This is temporarily interfering with building operations and is much to be regretted, but will no doubt have a speedy termination in some way. There is a brisk demand from all sections of the country, excepting the cotton States, for seasonable goods, and notwithstanding the backwardness of the spring, the growing crops promise well, and indications point to a continued good business for some time yet before midsummer dullness occurs. Collections are not to be complained of, and are probably, on an average, equal to those of any other year.

Boston.

BIGELOW & DOWSE.—No one in this section is complaining of dull trade. Every retailer and wholesaler is busy. Sales are not confined to any special lines, but cover the general assortment of Hardware.

The high prices made by the Cordage Trust are fostering foreign competition. Notwithstanding a protective tariff of 1½ cents per pound, foreign Manila Cordage and Binder Twine is being sold here under the price of the American combination. Large foreign manufacturers are waiting to see what action Congress will take regarding the duty on Binder Twine. If the duty is removed they will manufacture it abroad and carry large stocks here; if not, they will build large factories in this country.

Prices on all kinds of Hardware are very

low, and there has been but little cutting of late.

New Orleans.

A. BALDWIN & Co.—Continuous rains, very high rivers, which has caused considerable anxiety, brings business in this section to about the point it usually reaches in midsummer. Very quiet tone in almost every department and every line of trade seems to have settled down in this Southern section of country. For the past week the weather has brightened somewhat and the outlook is more cheering for an improvement in the builders' line, and it gives them a chance to start in with their contracts for the summer season.

Staples are inclined to be a little dull and not the same movement in Nails or Barb Wire that characterized the previous 30 days' business.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—Business is rather quiet, there being too much rain. Seeding is progressing very slowly, and will be late, with a reduced acreage. Business for the month of May somewhat below expectations, but favorable weather will quickly improve it.

Notes on Prices.

Wire Nails.—We have to report a further decline in Wire Nails, which have reached a lower point than any previous time in the history of the industry. Instead of \$1.65, or even \$1.60, which were referred to in last week's report as the price of carload lots from factory, \$1.55 is now named as representing the manufacturers' price in round lots. Even this figure, however, is not adhered to, and during the week Western mills have offered Nails at \$1.50. Others, however, while shading \$1.55, have refrained from quoting \$1.50. Notwithstanding the low prices ruling manufacturers are evidently desirous of securing orders. While the trade recognize these figures as extremely low, some of the leading houses are refraining from making very large purchases, thinking that possibly there may be further developments of the market which will enable them to place orders still more advantageously. The condition of things in this line is thus far from satisfactory.

Chicago, by Telegraph.—From the way some of the leading manufacturers are quietly shipping around among the heavy buyers it would appear that they have blood in their eyes, as prices made are said to be the lowest that have ever been made in this market. Sales have been freely made at \$1.60 rates, f.o.b. Chicago, but this does not signify that it is the bottom price that would be made on favorable specifications. Jobbers are quoting \$1.70 rates in carloads from stock. There are other manufacturers who refuse to meet the lowest prices named.

Cut Nails.—Especially in the West and to some extent also in the East Cut Nails are feeling the effect of the very low prices ruling in Wire Nails, and as a result some lower quotations are being made by lead-

ing mills in the West. For carload lots of Steel Nails at Western mills \$1.45 to \$1.47½ on a 30-cent average fairly represents the market. There is, however, some diversity in the quotations of the different manufacturers, and it is understood that some low quotations have been made. In the East the market is characterized by more regularity, and the understanding between the manufacturers on the basis of \$1.55, at mill, for Steel Nails, is well maintained, freight being equalized with competing points. A concession of 3 cents a keg is made on Iron Nails, and orders of 1000 kegs or more of either Iron or Steel Nails are quoted at 5 cents less. Small lots from store in New York remain at \$1.75.

Chicago, by Telegraph.—In the way of demand there is no change in the condition of the Cut-Nail market. Prices, however, have declined, whether from sympathy with Wire Nails or from competition for orders cannot be stated. Quotations have been made on carload lots, Chicago delivery, at \$1.60 @ \$1.65, according to quantity and quality. There is a demand for some round lots of good Nails at less than these prices, which has not been conceded by makers.

Barb Wire.—The volume of business during the season has evidently been satisfactory to the manufacturers, and many of them still have orders on their books. The price remains where it has been and manufacturers are not disposed to make any considerable concessions to secure business. Quotations are on the basis of \$2.65 for carload lots of Four-Point Galvanized at mill. Small lots from store in New York are held at \$3.10, with 10 cents off for carload lots.

Chicago, by Telegraph—The situation of the Barb Wire makers is the same as last reported. Manufacturers are still behind in their orders and are uniformly asking \$2.30 for Painted Wire in carload lots, and \$2.80 for Galvanized. The demand is greater than they can supply, and some manufacturers are contemplating increasing their capacity, with rumors that new plants will soon be established by parties not now engaged in the business. Jobbers have made no changes in their prices from store.

Wrought Butts.—While there is no quotable change in the prices of Wrought Butts as announced by the manufacturers, the prices ruling are lower than they were a few weeks ago, and the market is regarded as low and irregular.

Strap and T Hinges.—For the past few weeks there has been a somewhat unsettled feeling in the Strap and T Hinge market owing to the fact that quotations are current at less than the regular prices determined upon by the associated manufacturers. These are understood to result from quotations made by a house outside the combination, by which the regular prices of other makers are undersold. While there is a disposition on the part of associated manufacturers to maintain prices as far as possible, a somewhat un-

settled feeling is induced, and it is not unlikely that there will be further developments before long. In this connection it is to be noticed that some leading jobbing houses are selling the goods to the retail trade at prices lower than ruled a month or two ago, and closely approximating the extreme prices contemplated by the manufacturers' agreement.

Cordage.—The Cordage market possesses no specially new features, the regular quotations remaining as before. These, however, continue to be shaded by the holders of stocks of goods purchased at the lower prices which prevailed some time ago, and also by representatives of the National Cordage Company, who make slight concessions where necessary. There are no further public developments in regard to the relations between John Good and the National Cordage Company, and some well-informed parties express doubt as to whether there is not still an understanding between them, the ostensible discontinuance of their agreement being on account of the apprehension that it might be treated by the Government as contrary to the Anti-Trust law. In the present condition of things there is an unsettled feeling in regard to the future prices of Cordage and the fact that foreign competition is likely to be felt has also its effect upon the market. The only changes in price to be noted are the following revised quotations on specialties, which are subject to the regular discount of 1 cent a pound and 1½ per cent. discount for cash in ten days, a deduction of ¼ cent additional being made in carloads:

Russia Tarred Rope and Ratline.....	\$0.09½
Marline, Houseline, Hambroline and Rounding.....	.11
Tarred Hemp and Spun Yarn.....	.08½
Russia Bolt Rope.....	.13

Oakum.—The market for Oakum is slightly lower than it has been and characterized by more than the usual irregularity, there being considerable diversity in the prices quoted by different houses. This is indicated by the following quotations, which show the range of prices which are at present named in this market, terms, f.o.b. New York:

Best.....	\$0.06¼ to \$0.06¾
United States Navy.....	.05¾ to .061
Navy.....	.04¾ to .05¾

Some houses also refuse to meet these quotations and name higher figures.

Tool Chests.—The discount sheet printed below is issued by the American Tool Company, 200 West Houston street, New York, and applies to their catalogue, May 1, 1892. It is of interest in a general way as indicating the extensive line of Tool Chests complete and Empty Tool Chests which they are putting on the market. Terms 30 days net, or 1 per cent. discount for cash in 10 days:

Complete Tool Chests.	Discount. Per cent.
Boys' Chests, Nos. 55 to 0¼ inclusive.....	50
Youths' Chests, Nos. 2A, 1A to 4 inclusive.....	40
Gentlemen's Chests, Nos. 4½ to 6½ inclusive.....	30
Farmers', Planters', Railroads', Mines', and Carpenters' Chests, Nos. 7 to 13 inclusive.....	20
Housekeepers' Chests, Nos. 550 to 750 inclusive.....	50
Boys', Youths' and Gentlemen's Eureka Chests, Nos. 22 to 215 inclusive and 20 to 25 inclusive.....	50

Handy Chests, Nos. 1266 to 1269 inclusive.....50
Gentlemen's Chests, No. B, and Gentlemen's Chests with Drawer, Nos. 450 and 460.....50

Empty Chests.

Boys' Nos. 55 to 0¼ inclusive.....70
Youths', Nos. 2A, 1A to 4 inclusive.....40
Gentlemen's, Nos. 4½ to 6½ inclusive.....30
Farmers', Planters', Railroads', Mines' and Carpenters' Chests, Nos. 7 to 13 inclusive.....20
Machinists', Nos. 250, 350 and 450 inclusive.....50

Brass Screw Hooks and Cup Hooks.

—Sargent & Co., New Haven, Conn., and New York, announce revised list prices on their Brass Screw Hooks and Brass Cup Hooks, as given below. The list prices are subject to a discount of 80 and 10 per cent.:

No. 412, Brass Screw Hooks.

Inch.....	¾	¾	¾	1
Per gross.....	\$2.70	2.85	3.35	4.00
Inch.....	1¼	1½	1¾	2
Per gross.....	\$5.00	6.00	8.50	10.50

No. 81, Brass Cup Hooks.

Inch.....	¾	¾	¾	¾
Per gross.....	\$3.65	3.75	5.85	4.00
Inch.....	1	1¼	1½	1¾
Per gross.....	\$5.25	7.00	9.00	11.00

Glass.—At a meeting of Glass manufacturers held at Cleveland, May 12, it was decided not to shut down the Glass factories on the 30th of this month, as has been previously determined upon, but to continue running them until June 30. After a thorough discussion of the matter a vote was taken, which showed a willingness of but 60 per cent. of the factories to close down early, the remainder claiming that they could not fill orders already booked by May 30. It appears that the large and strong factories who have held to stiff prices have a large stock of Glass on hand, while the small and weaker ones who have accepted orders at low prices, are found with broken assortments and not in condition. The result of the meeting was not entirely unexpected by those interested in the Glass trade, as the decision of closing down early has not been an accepted fact. There is no doubt that in some cases orders for Glass in large quantities by large buyers have been placed as low as 85 and 10 per cent. discount with the manufacturers. There was no change made in the price of Glass at this meeting, but a committee was appointed, as is usual at this time of the year, to meet with the operators in July and adjust prices for the succeeding year. The price on French Glass of 80 and 5 per cent. discount seems to be well maintained. It is reported that there has been an attempt made to form a trust of all the Plate Glass factories in America, but that there are some obstacles still in the way, so that up to the present time no definite agreement has been reached. Quotations remain unchanged as follows: American Window Glass, 1000-box lots or more, 80, 10 and 5 per cent. discount; carloads, 80 and 10 per cent. discount; less than carloads, 80 and 5 per cent. discount; French Window Glass, 80 and 5 per cent. discount; American Plate is held at a discount of 50, 10 and 5 per cent., and imported Plate at a discount of 60 per cent.

NIXON & Co., 62 Dey street, New York, have recently commenced operating a Handle factory at Kensington, Ga. The business is conducted under the name of the Kensington Handle Works, and it is expected that about 60 hands will be employed when the plant is in full operation.

Marcus W. Robinson.

MARCUS W. ROBINSON, to whose death we referred in a recent issue, was born in Mansfield, Conn., May 12, 1820. He educated himself in his native town through his own exertions, and afterward taught school in Weathersfield.

After teaching for several years he engaged in the book business in the South, with headquarters at Louisville, Ky. About the year 1856 he came to New York and became bookkeeper and confidential clerk of Storrs Bros., who were engaged in the notion business at 121 Chambers street. He married Miss Storrs, the sister of his employers, and was subsequently interested in business with J. W. Storrs, who

was at that time selling agent for Smith & Wesson at 252 Broadway. In 1869 he became sole agent for Smith & Wesson, and, in addition to this line of goods, has been for the past 25 years a manufacturer and dealer in hardware specialties. Mr. Robinson died at Storrs, Conn., May 5, and was buried in the Mansfield Cemetery May 9. He was at the time of his death 72 years of age. For the past 30 years he had been a member of Plymouth Church, Brooklyn, and had several times been elected to church offices, but always declined, owing to his retiring disposition. He was an unostentatious man, but one of sterling integrity, and was held in the highest esteem by all who knew him, and had many warm friends among the members of the hardware and gun trade in this city and throughout the country. He is held in especially kind remembrance by a large number of business men, to whom he became a valuable friend in their younger days, and to whom through many years he extended assistance, not only by advise and counsel but also by generously coming to their relief in times of financial need. A striking illustration of the regard in which he was held by those with whom he had had business transactions was seen in the large number of those who gathered at the grave to pay respect to his memory. Among these were many who largely owed their success in business life to the friendship of their departed friend, and who did not tire of recounting his acts of friendship.

UNION HARDWARE CO., Union, N. Y. send, Supplement to 1887 Catalogue. Illustrations are given of Wrought Iron Step Pads, Wrought Body Steps, Brew-

ster Saddle Clips, Shaft Couplings, Clevis and Draw Bolts &c.

Trade Topics.

A correspondent in the West, referring to the plan adopted by many Hardware men of charging all goods with a certain percentage to cover the cost of selling them, as well as general business expenses, writes:

It is not fair to charge up a general stock with the same percentage of cost. Some goods are handled at a trifling percentage of cost, and others at a high percentage. A customer comes to buy a thumb latch and knows what he wants. All you have to do is to hand it to him and the business is done, while, if he wants a lock you may have to show him a

don't know how to get ahead in business." Sell good goods at a profit. As one of the best-known Hardware jobbers in the country once said to me while in his office, "I have sat here for 30 years urging on the trade the necessity of selling goods at a profit. When a man makes that his aim he will succeed. If he tries to undersell everybody else he will make a failure." He was right.

Louisville.

THE CONDITION of the Hardware trade of Louisville is reflected in the following advices, received from a special correspondent in that center:

The Hardware trade in this city feels the general quietness very materially. The jobbers are getting used to low prices and cuts, so much so that they can hardly be surprised any more at discounts named therein. Months ago, when prices on certain lines of manufacture were \$5 to \$10 per ton higher than at present, the millmen claimed they were losing money. True, Bessemer Pig has declined about \$3 per ton, but this does not make the difference. If they were losing then, are they making any more now? Yet such works as Barbed and Plain Wire, Wire Nails and others are still on the go, the factories crowded with work, some actually anxious to sell at very low prices. All of this should not, perhaps, concern the jobbers, but it does. They don't know how actually to buy in certain lines. It is not so much the scarcity of business, lack of orders, but instability of prices. A thousand kegs of Wire Nails purchased to-day with the expectation of realizing 10 cts per keg profit on them will probably be sold at a loss compared to prices ruling two weeks hence. And it is so in many other lines. Mill men are urging that labor troubles during next month and July will cause a long shut down and consequent scarcity of materials, but the trade generally believes in the common sense of the work-



MARCUS W. ROBINSON.

dozen before you find one that suits him and that is true of many other articles. And so, too, in charging up a percentage of profit; you can only get a good profit on goods that people know little about the cost or are specialties.

In regard to the matter of maintaining prices and selling goods at a profit, our correspondent adds:

I believe in selling goods at a profit or keeping them on your shelves, though it is pretty hard to see your trade leave you to go to a competitor who is selling goods at cost or less. Of course, there is an end to that kind of work some time, but you are losing, too, even if your competitor has to go into bankruptcy. Our customers respect us for our fairness and honest trading, and not because we sell cheap. They will buy our cheap goods and say of us, "Well, he is a good fellow, but he

men, and that they will readily see the necessity of heavy scaling in wages—that the day for high-priced Iron and Steel is past, that there will not be any more "2 cent card" as base, but one nearer half that rate must rule.

The Pig Iron men say that bottom has at last been touched, and prices cannot go any lower. Perhaps they feel so assured, but it will take a long time for this tonic to affect the general pulse. The season for Barb Wire is about over. Wire Nails are slow of sale, for some unaccountable reasons, and Cut Nails are not any brisker, although our busy building season (if one should materialize at all) is with us. Bar Iron trade is always good in Louisville, but the Sheet trade is now becoming dull, with some few good orders in sight, but at what prices; Oh, ye gods! Collections are good, and we are all making some money.

Penn Hardware Company.

THE 1892 catalogue of the Penn Hardware Company, Reading, Pa., contains over 700 pages and effectively illustrates their extensive line of goods. A full-page illustration at the front of the books gives an excellent view of their large works. This is followed by a table, in which a comparison of names of finishes of six manufacturers is given, including their own. This is followed by an alphabetical index and an index to the numbers of their Locks and Latches. Illustrations are given of Butts, Bolts, Cupboard Catches, Store-Door Handles, Hat and Coat Hooks, Frame Pulleys, Sash Fasteners, Locks, Latches, Escutcheons, Knobs, Electric-Bell Push Buttons, Drawer Pulls, Awning Pulleys, Shelf Brackets, &c. The book is well arranged and the cuts are clear and distinct.

Number of Wire Nails to the Pound.

IN CONNECTION with the discussion of the question as to the number of Standard Wire Nails there should be to the pound, the table given below, which is furnished by one of the leading manufacturers of these goods, will be of interest. It will be observed that there is not an entire agreement between it and the table furnished by another manufacturer, which was published in our last issue:

Size.	Inch.	Gauge.	Number per pound.
2d Fine.....	1	17	1558
3d ".....	1 1/8	16	1015
2d Common.....	1	15 1/2	1010
5d ".....	1 1/4	14 1/2	668
4d ".....	1 1/2	13	357
5d ".....	1 3/4	12 1/2	270
6d ".....	2	12	204
7d ".....	2 1/4	11 1/2	161
8d ".....	2 1/2	10 3/4	119
9d ".....	2 3/4	10 1/2	102
10d ".....	3	9 1/2	76
12d ".....	3 1/4	9	63
16d ".....	3 3/4	8	49
20d ".....	4	6	31
30d ".....	4 1/2	5	24
40d ".....	5	4	18
50d ".....	5 1/4	3	14
60d ".....	6	2	11

Price-Lists, Circulars, &c.

CHARLES MORRILL, New York: Morrill's Perfect Saw Set. Attention is called to the fact that the No. 1 Saw Set has been so improved as to set jig and scroll saws from the widest made down to the narrowest. The improved Set will be substituted for the No. 1 Set, so long known to the trade.

O. S. JUDD, New Britain, Conn.: Sash Fasteners, Window Spring Bolts, Harness Snaps, Steel Halter Chains, Picture Knobs, &c. His 1892 catalogue shows these goods in a large variety of styles, together with list prices of the same.

HENRY DISSTON & SONS, Philadelphia, Pa.: Keystone Saw, Tool, Steel and File Works: Their 1892 catalogue of 125 pages contains illustrations, descriptions and prices of Saws, Tools, &c. Special attention is directed to new goods which have been added, also to the regulation in prices of some standard articles.

W. J. CLARK & Co., Salem, Ohio: Sundry Hardware, Wooden Ware and House Furnishing Articles. Their 1892 Catalogue shows Clark's Family Oil and Gasoline Cans, Rotary Oil and Gasoline Cans, Blue Brand, Diamond, Boss and Sensible Oil or Gasoline Cans, Storage Tanks, Retailers'

Oil Tanks, Fire Shovels, Wagon Jacks, Washboards, &c.

WHITE MFG. COMPANY, Bridgeport, Conn.: Carriage Lamps and Mountings. Illustrations and price lists are given of Lamps in a large variety of styles, Rim Bands, Pole Crabs, Door Handles, Morocco Covered Trimmings, Pole Tips, Whiffletree Ferrules, &c.

THE TOPP & ELY COMPANY, Elyria, Ohio: Steel Bow Sockets, Leather Covered Bow Sockets, Side Spring Equalizers and specialties in Carriage Hardware. The manufacturers state that their goods have been before the public since 1870, and that it is their design to improve and increase their product.

THE WILLIAM ROGERS MFG. COMPANY, Hartford, Conn.: Catalogue No. 38, Pocket price-list of Rogers' Spoons, Forks, Knives, &c. In presenting a new and revised pocket price list they state that, as in the past, they shall continue to put nothing but the latest designs and the best quality of goods on the market.

F. W. WURSTER & Co., Brooklyn, N. Y.: Spring and Axle Works. Axles are shown in Common or Loose Collar, Solid Collar Wurster Brand, Half Patent, Rogers Solid Collar, Oil Cup Nut Axles, Lubricating Axles Axle Oiler, Collinge and Half Collinge Axles, Mail Axles, &c. The manufacturers state that they can supply everything that is used in the line of Springs or Axles, and that having lately increased the capacity of their works by the addition of some of the most improved machinery, they are in a position to make Springs and Axles equal to any in the market, and to fill orders promptly.

KEYSTONE LOCK WORKS, E. T. Fraim, Lancaster, Pa.: seven additional sheets for their catalogue. These show Bicycle Padlocks, Padlocks in Solid Bronze and Steel, Self Locking Scandinavian Padlocks and Scandinavian Padlocks, extra cheap grade. The above are referred to as all new goods.

A. C. ROGERS MFG. COMPANY, Piqua, Ohio: Piqua Natural Wood Lock Furniture. Their price list and illustrated catalogue shows Wooden Door Knobs, Escutcheons, Shutter Knobs, Base Knobs, Electric Push Buttons and kindred goods. These goods are made in style and finish to match various woods, at, it is stated, a much lower figure than either bronze or brass. The shanks and roses are finished in bright natural color of bronze metal, dark brown or acid bronze, bright surface and black background, oxidized silver, antique copper and antique brass.

THE COBURN TROLLEY TRACK MFG. COMPANY, Holyoke, Mass.: Coburn Trolley Track, Store Step Service, Inside House Door Hangers, Barn and Mill Door Hangers, Fire Door Hangers, Elevator Door Hangers, Freight Car Door Hangers, Baggage Car Door Hangers, Carrying Track, Fire Escapes, Fire Shutter Hangers, Barn and Fire Door Stay Rolls, Fire Door Stops, &c.

AMERICAN WIRE GOODS COMPANY, Lowell, Mass.: "BB" Wire Coat and Hat Hooks. These goods are shown in a large variety of forms—to drive, to screw on and to screw in. The manufacturers state that the "BB" Hooks are nicely finished, strong and durable, having broad bearings on both branches, broad backs and a brace between both branches.

BELLAIRE STAMPING COMPANY, Harvey, Ill.: Plain and Re-tinned Stamped Ware, Enameled Steel Ware, Central Draft Lamps, Tubular and Buckeye Lanterns, and Sheet Metal specialties. Their catalogue of 74 pages, bound in flexible cloth covers, contains a perspective view of their new factory at Harvey, Ill., a town 2 miles from Chicago. Special attention is given to a new line of ware which they have only lately engaged in manufacturing known as Blue and White and Gray Enameled Steel Ware. The manufacturers state that they make a full line of this ware, and make a special effort to have

the quality and finish superior to the imported and domestic articles of the same character. Their new plant was arranged more especially for the manufacture of this line. They are now enameling a number of specialties for other parties, and are open for further contracts of extensive character.

JOHN STORTZ & SON, Philadelphia, Pa.: New and seasonable Tools and Hardware Specialties. Their supplement No. 1, price list and illustrated pamphlet, shows Jack Claws, Carpet Stretchers, Ice Picks, Ice Chisels, Ice Tongs, Screw Drivers, Stone Drills, Stone Chisels, Brick Hammers, Rivet Sets, &c.

HUNT, HELM & FERRIS, Harvard, Ill. Hay Carriers, Haying Tools and Hardware Specialties. Illustrations and descriptions are given in their catalogue, No. 13, of Hay Carriers, Haying Tools, Star Door Stay Roller, Round Bar Carpet Stretcher, Star Express Wagon &c. The company state that they are bound to yell until every dealer in the United States learns that the above Star goods are the best on earth.

ELECTRO NOVELTY COMPANY, Boston, Mass: Electrical Toys and Novelties of every description. Illustrations, descriptions and prices are given of Novelty Electric Motor and Battery, Medical Coil, Telegraph outfit, Electric Bell outfit, Plating outfit and a variety of cardboard figures to be worked by the motor. Special attention is called to their Novelty Electro Plater, retailing for \$5, and also to their Toy Motor, which retails for \$1.50.

THE GWINNER MFG. COMPANY, Hamilton, Ohio: Gwinner's Common Sense Two-Wheel Casters, Adjustable Stove Trucks, Hercules Three Wheel Truck Caster, Store and Factory Trucks. They state that their Casters consist of three pieces, two floor wheels and an axle, and are held together without screws or washers, but are loose, so as to be capable of rotating and oscillating as the furniture is moved over uneven floors.

JOS. DIXON CRUCIBLE COMPANY, Jersey City, N. J.: Illustrated catalogue and price-list of Graphite products, including Dixon's American Graphite Perfect Lubricator, Everlasting Axle Grease, Graphite Grease, Graphite Paint, Electrotyping Graphite, American Graphite Pencils, &c. Some flattering testimonials relating to the goods are also given place.

THE FRANCIS T. WITTE HARDWARE COMPANY'S CATALOGUE.—The Francis T. Witte Hardware Company, 106 Chambers street, New York, have issued a catalogue of 448 pages, giving illustrations and list prices of Builders' Hardware, Tools, Contractors' Hardware and Tools, Household and Kitchen Outfits, Iron, Tin and Agate Ware, Cooking and Household Implements, Silver-Plated Table Ware, Pocket and Table Cutlery, Rogers' Scissors, Carving and Hotel Cutlery, Guns and Fire Arms, Refrigerators and Ice Chests, Ice Cream Freezers, Ice Making Machines, &c., &c. The catalogue is 5 1/2 x 7 3/4 inches in size, bound in flexible cloth. The distinctive features of the book are the large variety of goods represented and the compact and convenient form in which the lists are arranged. Illustrations are given of almost the entire line of goods represented, which makes the work of additional value. A comprehensive index at the front of the book is arranged alphabetically, by which ready reference to the pages on which the goods are found may be had. The catalogue contains a fund of information regarding Hardware, which is invaluable to the retail merchant, and which probably could not be found between any other two covers. The lists and numbers are for the most part standard, and the catalogue is accompanied by a book of discounts of over 30 pages. The convenient size of the work in comparison with the matter it contains is a feature which will be appreciated.

Hardware Store of W. F. McCarroll & Son.

The store of W. F. McCarroll & Son, Ottumwa, Iowa, illustrations and description of which we give herewith, is particularly interesting, not only because of its admirable arrangement, but because there are no counters in the building. Up to about three years ago the firm carried on a Stove, Tinware and House-Furnishing business, but at that time added a full line of Shelf Hardware. At the time of adding Hardware the store was fitted up with counters, on which were showcases; with ordinary shelving at the sides, and thus arranged the store was full of goods.

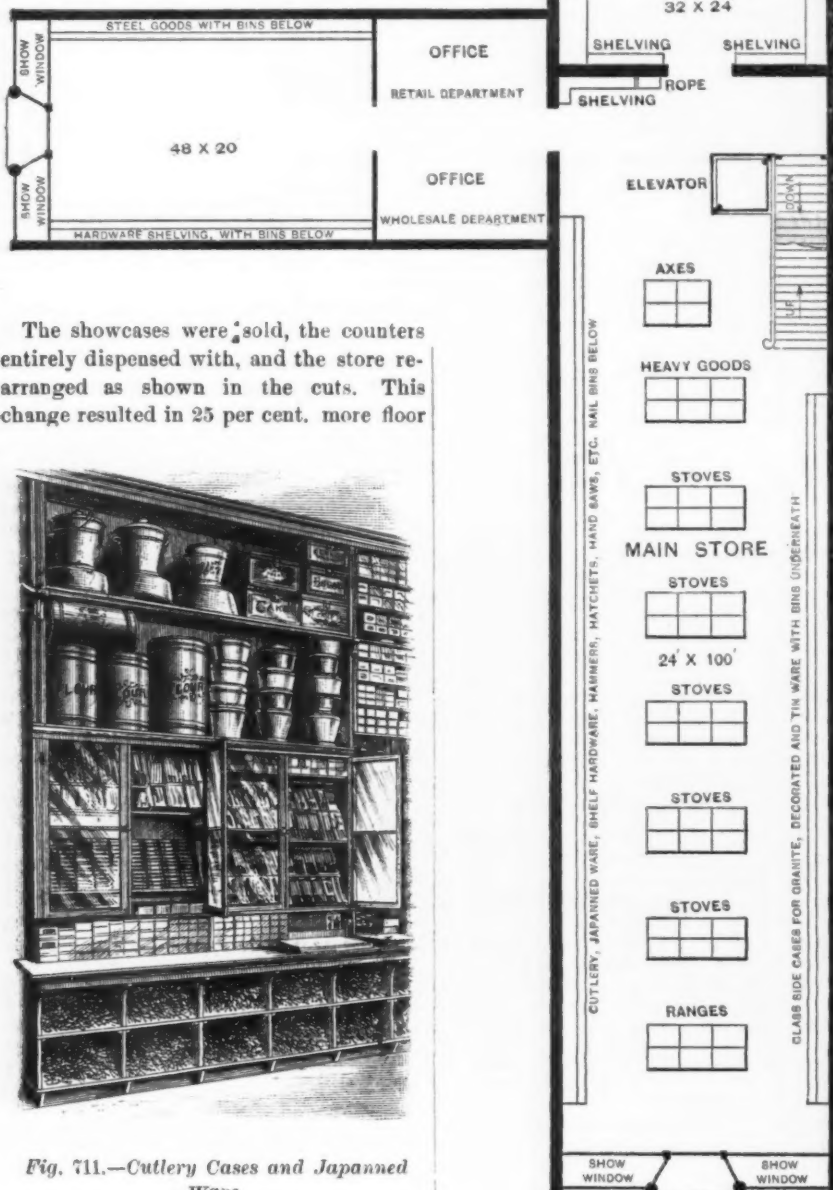


Fig. 710.—Plan of the First Floor.

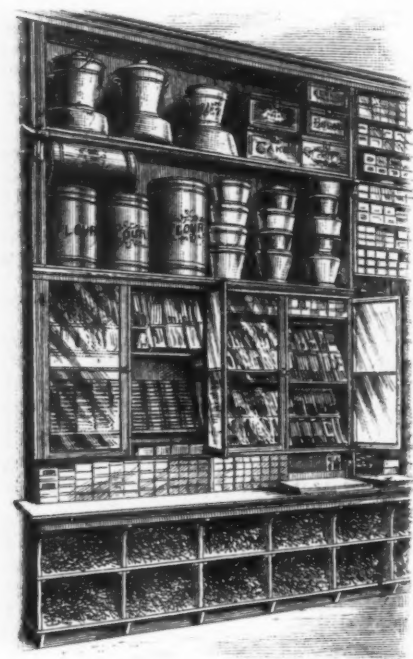


Fig. 711.—Cutlery Cases and Japanned Ware.

room than before. The main building, 24 x 100, fronts on Main street, and is three story with basement. In the rear of this is a one story and basement room, 24 x 32, which opens on the alley. The L part of the building is 20 x 48 and fronts on Court street. The basement in the main building is used for storing Stoves and other goods; while the basement in the rear is used for keeping stock of Tin Plate, Sheet Iron, &c., except the extreme

rear next to the alley, where Stoves are blacked. This keeps the dust and dirt incident to this work from the salesroom. The first floor, from front to rear, has a rise of 3 feet, admitting of a large opening under the tin shop for the receipt of goods. Goods are also received at the Court street entrance. Fig. 710 shows

would be put on platforms or on the floor; the platforms being moved each day to allow for thorough sweeping. The shelving on the left side of the main room is ar-



Fig. 712.—Shelf Hardware and Fine Tools.

ranged for Cutlery, Shelf Hardware, Tools, &c., under which are bins for Nails. The opposite side has shelving, with glass doors

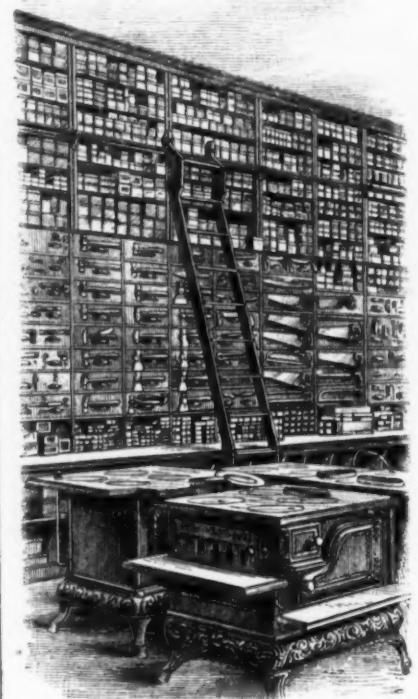


Fig. 713.—Carpenters' Tools, &c.

the arrangement of the first floor, the center of which is taken up with platforms 2½ x 3 feet, mounted on strong Martin casters. The platforms being of uniform size admits of arranging them in various ways, the arrangement shown in the cut however, being the favorite plan. These are used for Stoves, or for any goods that

for Granite, Tin and decorated ware, with closed bins underneath. The elevator and stairs are in the rear of this

room. In the rear of the main store is the tin shop, with benches and shelving. Steel Goods are kept on one side of the L part and Hardware on the other side, with bins under shelving on both sides. The ledge shelves above the bins on both sides

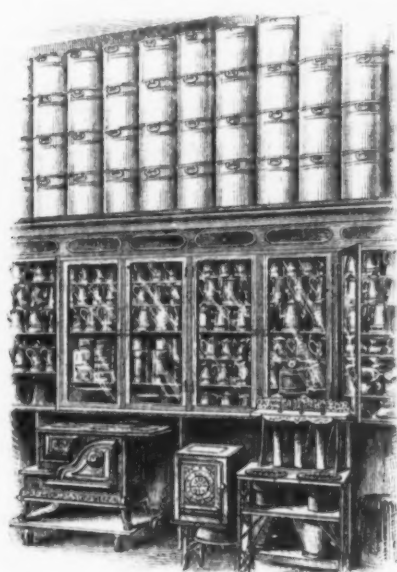


Fig. 714.—Tin, Granite and Decorated Ware.

of the main room are of extra width, taking the place of counters, admitting of goods being shown upon them. The shelving on the left hand or Hardware side of the store, runs to the ceiling and has a traveling ladder in front. Fig. 711 shows the arrangement of Cutlery, which is on the end of the shelving next to the front left show window. The Table Cutlery is kept in small tin boxes, one for Knives and one for Forks, and are placed on an incline, one box above another.



Fig. 715.—Covered Bins for Elbows, &c.

Their experience is that most customers are not satisfied with seeing one knife and fork for a set, but are better pleased if shown all.

The Pocket Cutlery, as shown, is sampled on a plush covered board, which plan has proved very satisfactory, as a customer can see the whole line at a glance; and if suited at all can be quickly served. The Cutlery is protected from dust and dirt by glass doors, underneath which is kept the surplus stock. Figs. 712 and 713 are continuations of the shelving on this side of the store, and show Shelf Hardware in boxes, glass case for fine tools, sampled Carpenters' Tools, &c. The shelf boxes next to the Cutlery case are 6 x 6 inches and increase in width to the rear. They are all 16 inches deep, which admits of drawing them out 10 or 12 inches without



danger of their falling. Above the Hardware boxes, surplus stock is kept in original packages. Under this shelving Nail bins extend back as far as necessary, the remaining bins being used for heavy and bulky articles. In Fig. 714 the arrangement of shelving is shown on the right-



Fig. 716.—Steel Goods with Bins Underneath.

hand side of the store, the glass doors protecting the Tin, Granite and decorated ware from dust. The partitions under the cases, for a portion of the distance from the front, are far enough apart to allow of a stove and platform being pushed in, thus economizing room. Under the remainder of these cases are covered bins for Elbows, Hollow Ware, Stove Pipe Thimbles and other unsightly goods, Fig. 715.

This arrangement not only keeps them from view, but keeps them clean; and when shown to a customer, it is not neces-

sary to raise a cloud of dust with a duster. The provision for Steel Goods, which are kept in the room fronting on Court street, is shown in Fig. 716. For this use one of their old counters was faced around, the front next to the wall, and partitioned off

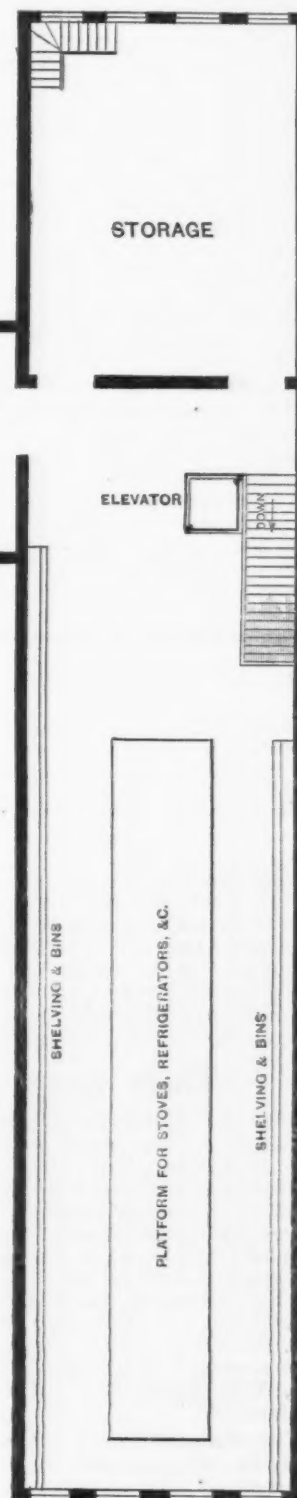


Fig. 717.—Plan of Second Story.

into bins. Strips on which are harness hooks were fastened to the wall at convenient heights, against which the goods are placed. The second story, Fig. 717, is used for storage and is fitted with bins or deep shelving, the center being reserved as a salesroom for such goods as they are unable to show on the first floor. The third story is used exclusively for storage. It is hardly necessary to add that McCarroll & Son are well pleased with the arrangement of their store, and that the main room particularly presents an exceedingly neat and attractive appearance.

Questions in Regard to Net Prices.

WE ARE IN RECEIPT of inquiries from two well-known houses in New England with reference to the desire of the jobbers to have a more general use of net prices in connection with the sale of Hardware. Both of these questions are suggestive, and we take pleasure in laying them before our readers:

One Price to All Customers.—We have read the articles on net prices with interest. We confess we cannot see how a manufacturer with a clientele of customers which may be ranked into classes of varying purchasing power could very well adopt the new plan for all classes except at considerable trouble. *Does the new plan imply one price to all sizes of customers?*

Where will This Paring of Profits End?—It cannot be denied that there is a growing tendency toward the use of net prices where lists and discounts have heretofore been in vogue. The reason for this is obvious, the lists having been made years ago, when there was a respectable margin in goods; but now profits have become so close in most lines that it is necessary in taking assorted orders to figure on the actual cost of each size, the quantity being considered. I am of the opinion that net prices will grow to be the rule where large orders are being placed for one or few sizes. But I do not think a general abandonment of lists and discounts, &c., is practicable nor desirable, for the reason that with such goods as Tacks, Screws and Wire Brads, the multitude of the sizes would render it almost impossible for the buyer to keep net prices in his head. There will be undoubtedly, however, with such goods as I have named, continual revisions of the lists, with the idea of equalizing prices of the various sizes on the basis of cost. The great question in my mind is, where will this continual squeezing and paring of profits end? Is there any other culmination possible than the fulfillment of Bellamy's dream.

Trade Items.

GILBERT & BENNETT MFG. COMPANY, New York, Chicago and Georgetown, Conn., in their page advertisement in this issue again call prominent attention to their ability to fill all orders for regular sizes of Poultry Netting promptly, having a large stock of the goods on hand to enable them to meet the requirements of the trade. Attention is also directed to their Steel Wire Fencing, Pearl Wire Cloth for door and window screens, Wire Cloth Netting, Fencing, Wire Goods, Wire Work, Stable Fixtures, &c.

THE CHICAGO SCALE COMPANY, Chicago, Ill., advise us that the business of the company will soon be largely increased and that many articles outside of Scales will be added to their list. W. W. Nutting, for over 30 years identified with the company, has been elected president, with T. M. Jackson of the Chicago National Bank as treasurer. The Little Detector Scale which the company put on the market several years ago, has, we are advised, met with a very gratifying sale. Reference is made to its compactness and portability. It is described as made with steel bearings and a neat brass beam, and has a capacity of $\frac{1}{4}$ ounce to 25 pounds. While the Scale was at first only intended for housekeepers' use, it is stated that it has been found so convenient for shops and stores that nearly 20 modifications have been made in it. The Scale as now put on the market is equipped with a postal beam, which shows at a

glance the postage on any class of mail matter in cents.

IN OUR ADVERTISING COLUMNS this week is shown Hudson's Garden Hose Mender, which is made in three sizes for $\frac{1}{4}$ -inch, $\frac{3}{4}$ -inch and 1 inch hose, and is put up in boxes for family use, each box containing 1 pair plyers, 20 bands and 6 tubes. This device is manufactured by C. E. Hudson, Leominster, Mass., and has been extensively advertised to consumers.

B. W. GOODSSELL and the **Swain-Goodsell Metallic Packing Company**, Chicago, have been succeeded by the **Goodsell Packing Company**, with office and store corner Canal and Washington streets in that city. The **Goodsell Packing Company** will continue the manufacture of the following specialties: **Goodsell's Rubber Back Flax Piston Packing**, **H. Cla Sheet Packing** (self-vulcanizing), **Removable Gaskets**, **Wire Insertion Gaskets**, **Sheet-Rubber Packings** and the **Swain Metallic Packing**. A jobbing trade will be done in **Mechanical Rubber Goods** and **Mill and Mining Supplies**. The management of the new company will be in the hands of **B. W. Goodsell**, we are advised, who has been the chief promoter of the concerns which they succeed.

FOSTER ENGINEERING COMPANY have removed their main office and factory to 21 and 23 Prospect street, Newark, N. J. Their present New York office, at 81 and 83 Fulton street, will be retained. The factory is equipped throughout with new and modern tools, which will give the company such facilities as will enable them to meet the increasing demand for their Valves more promptly than they have been able to do during the past year.

THE PIQUA HANDLE AND MFG. COMPANY, Piqua, Ohio, on account of the introduction of natural gas in their section which ruined their sale for fire wood of waste material in the manufacture of the company's Farming Tool Handles, have been compelled to enter into new lines which would use the waste timber. They have accordingly added to their business the manufacture of Chisel, Screw Driver and File Handles, Base Knobs and all classes of small turned goods. The company have also added a new department to their works, styled the **W. C. Rogers Mfg. Company**, which makes a fine line of Wooden Door Knobs, Escutcheons and Electric Push Buttons, and advise us that they have met with gratifying success.

AT THIS SEASON especially the announcement of **Linsley, Root & Co.**, New Haven, Conn., in regard to **Linsley's Wire Cloth and Netting Price Book**, will be of interest. This book since its introduction a year ago has found its way into Hardware stores in nearly every State, and seems to have been accepted as a standard method of computing sales of Wire Cloth and Netting. A dealer in Boston referring to it says, "It is a part of the business to have it."

THE MONARCH CYCLE COMPANY, Chicago, have recently made arrangements by which agencies are established in leading cities in Illinois, Michigan, Pennsylvania, Ohio, New York, New Jersey, Massachusetts and Connecticut, while negotiations are being carried on looking to the introduction of the **Wheels** in other States. The company advise us that the demand for their goods is excellent.

THE DE WITT WIRE CLOTH COMPANY, 32 Reade street, New York, and 703 Market street, Philadelphia, are introducing very largely their special Wire Cloth for window and door screens this year, and have forwarded packets, containing samples of the different qualities manufactured by them, as circulars. They claim that their Wire Cloths, which are supplied with patent metallic coat, or as solid bronze metal or pure copper, are more durable and less expensive than the ordinary painted cloth;

that it will not rust, and that dust or dirt will not adhere to its surface.

THE CAMPBELL CUTLERY COMPANY, Syracuse, N. Y., are furnishing free an assortment of **Campbell's Warranted Razors**, which they state sells for \$7.50, with each \$10 worth of **Campbell's Patent Practical Sliding Display Trays**. This offer is good for a limited time only, and is made with a view to securing future orders for both the Razors and Trays.

THE STILL FURTHER abandonment of the use of rivets in the manufacture of **Never Break Wrought Steel Cooking Utensils** by the **Bronson Supply Company** of Cleveland, Ohio, and 72 Beekman street, New York, is announced. They are now making all of their Flat and Round Bottom Kettles, Maslins and Scotch Bowls with solid ears and tips, in place of having them riveted on, as heretofore. This improvement is referred to as making the goods neater in appearance, while at the same time there are no rivets to get loose nor catch dish cloths.

AMONG THE SPECIAL NOTICES in this issue will be observed one in which **Wilson Bohannon**, 754-776 Lexington avenue, Brooklyn, N. Y., announces the destruction on May 16 of Post-office Station 8, Brooklyn. Fearing that some letters addressed to him have been destroyed, Mr. Bohannon requests a repetition of all correspondence addressed to him recently which has not been acknowledged.

THE FRAMINGHAM BRASS MFG. COMPANY have recently begun business at South Framingham, Mass., where they occupy a large and completely fitted up factory. They will manufacture Stamped Brass Goods in great variety and make a specialty of Chandeliers, Upholstery and Electrical Goods.

THE Greenfield Gazette, Greenfield, Mass., commemorating the hundredth anniversary of its foundation, has issued a centennial edition, in which among other matters the manufacturing industries of the town are referred to. The business of **Wells Bros. & Co.** is thus given a conspicuous place, an illustration being given of their factory together with portraits of the members of the firm, **F. E. Wells**, **F. E. Snow** and **F. O. Wells**. This concern was established in 1876 and employs about 70 men.

AMERICAN CUTLERY COMPANY, Chicago, announce, May 7, that having enlarged their line of fine grade Cutlery to such an extent that it has become necessary to have showrooms convenient to the trade, they have opened at 402 Madison Temple, which will hereafter be their city office and salesroom. Here they will carry only a full and complete line of samples embracing a large assortment of fine goods handsomely cased.

WE ARE ADVISED that the **Salt Lake Hardware Company**, Salt Lake City, Utah, have purchased the entire stock of the **Pacific Hardware Company**, also of that city, and removed it to their commodious storerooms. The **Salt Lake Hardware Company** state that they will thus have one of the most complete stocks of Hardware west of the Missouri River.

C. A. WILLIAMS & Co., Skowhegan, Maine, in a recent circular state that they were the originators of the **Haines Hatchet**, which for ten years was manufactured for them by the **Underhill Edge Tool Company**, Nashua, N. H. Subsequently this company sold out to the **American Axe and Tool Company**, when **C. A. Williams & Co.** assumed the manufacture of the Hatchets. They announce that they now make and put their own stamp and label upon them. They guarantee these Hatchets to be the same in every respect as those formerly made, and solicit the orders of the trade.

It Is Reported—

That the Hardware store of Charles Beebe at Every, Iowa, was burglarized on the 7th ult. About \$60 worth of Revolvers, Knives and Razors were taken.

That the Watkins Hardware Company, Richmond, Va., are removing to more commodious quarters.

That Mr. Lovely of Howard City, Mich., has bought the Hardware stock of Jay C. Crittenden, Lakeview, Mich.,

That Hudson & Bruno, Wellsboro, N. Y., are contemplating the erection of a new store.

That Churchill & Co. have recently commenced the Hardware business at Yorkshire Center, N. Y.

That W. A. Robertson has purchased the Hardware store of R. Robertson at Cleveland, N. Y.

That the Hardware store of Hall Bros., Luzerne, N. Y., was entered by burglars some time since and \$100 worth of Silver Ware, Revolvers, &c., taken.

That Palmer & McBride have opened a new Hardware store at Freeport, Ill.

That H. C. Loeser and J. J. Lehr have formed a partnership and entered the Hardware business at Jackson, Mich.

That Rankin & Foss have leased a store at Astoria, Ore., and will open up a stock of Hardware in it.

That Richard Bierman of Cherry Valley, N. Y., is preparing to build a Hardware store on the site where his old one was burned.

That L. F. Holloway and E. C. Johnson have leased the store 12 and 14 South River street, Janesville, Wis., and will open a Hardware store therein.

That Jordan & Mott of Burlington, Iowa, have commenced the Hardware business at Muscatine, Iowa.

That Hewitt Bros., Hamilton, N. D., have taken possession of their new Hardware store.

That G. W. Jackson, Shabbona, Ill., is enlarging his Hardware store.

That Walter Bros & Stevens, Ravenna, Ohio, have opened their new Hardware store.

That G. W. Wood has commenced the Hardware business at La Villa, Fla.

That B. D. Beittle & Co. have opened a Hardware store in the Opera House at Columbus, Pa.

That Messrs. Newburg, Hanson and Ekstedt of Rockford, Ill., are contemplating the formation of a stock company for the purpose of carrying on the Hardware business in that city.

That J. C. Shanklin has purchased the Hardware store of F. Roush & Son, Frankfort, Ind.

That the Davis Hardware and Furniture Company have been organized at Davis, Tucker County, W. Va. The capital stock is \$8040.

That W. R. Bowman has purchased the interest of his partner, Edward Duppe, in the Hardware business at Forest, Ohio.

That the Rodick Hardware Company, Marietta, Ohio, have been incorporated, with a capital of \$10,000.

That the partnership of Messner & Weaver, Hardware merchants, at Ephrata, Pa., has been dissolved. S. L. Weaver, junior member of the firm, will continue the business.

That W. E. Penniman has bought out the interest of his partner, W. F. West, in the Hardware business at North Adams, Mass.

That J. B. Stetson, Silver Creek, Neb., has purchased E. S. Bailey's Hardware store.

That Edward Flaherty has formed a copartnership with Walter Crowell in the Hardware business at West Bend, Iowa.

That A. T. Stebbins has purchased the Hardware store of the A. Ozmun estate, Rochester, Minn.

That George A. Paulson's Hardware store at Fergus Falls, Minn., was burglarized on the 3d inst.

That C. E. Wilcox has opened a Hardware store at Alpena, Mich.

That the Dorman & Smith Hardware Company have been chartered at Salisbury, Md. Mr. Dorman is president and general manager of the company, S. Smith vice-president, and L. E. Williams secretary and treasurer.

That Solomon Stein and Joseph Mark have opened a Hardware store in the Hauer Building, Lebanon, Pa.

That Cromwell & Slade have opened a Hardware and Stove store at Gloversville, N. Y.

That E. W. Lowell has opened a new Hardware store at Janesville, Wis.

That Drake & Lindley are a new Implement firm at Argenta, Ill.

That J. H. Cogan & Co., Augusta, Maine, are making extensive improvements in their Hardware store by which their facilities for handling business will be largely increased.

That John B. Templeton is intending to open a Hardware store at Batavia, N. Y.

That McDougal & Co., Hardware merchants, Columbus, Ohio, are selling out their stock.

That Mrs. L. E. Mason of Woodhull, N. Y., has disposed of her stock of Hardware to Henry and James Walker, who will continue the business under the firm name of Walker Bros.

That Winter Bros., dealers in Hardware, Vandalia, Mo., were damaged by fire a couple of weeks since. Loss, \$100.

That James Hayden has entered into partnership with D. A. Hasbrouck, dealer in Stoves and Hardware, New Paltz, N. Y. The style of the new firm is Hasbrouck & Hayden.

That Davega Bros. & Co., Hardware dealers, Sheffield, Ala., have sold out.

That W. R. Hare has opened a Hardware store in Greenfell, Man.

That Geo. McGiffin of the firm of McGiffin & Campbell, Miami, Man., has sold out his share in the business to A. Lawrence. The style of the new firm will be Lawrence & Campbell.

That J. P. Supler, dealer in Hardware, Clarksburg, W. Va., has sold out to P. Kennan.

That the Hardware firm of Taylor & Markham, Little Falls, N. Y., have dissolved partnership. John R. Taylor will continue the business.

That H. H. Caswell, Hardwareman, Harrison, Maine, has moved into his new store.

That the Hardware store of Starr, Chatfield & Co., Owego, N. Y., was burglarized on the 21st ult. A quantity of Revolvers and Razors was carried away.

That the Hardware firm of Mandeville & Mutimer, Rockford, Ill., has been dissolved. E. A. Thompson has purchased the interest of Mr. Mutimer.

That W. H. Verrill has purchased the Hardware store of Henry Lundr, Hammond, Ind.

That Chester R. Converse is building a new Hardware store at Wellsboro, Pa.

That A. L. Mace and H. E. Tobey have purchased the Hardware store of G. E. Ogden, Walton, N. Y.

That William Thomas is building a Hardware store on Walden avenue, East Buffalo, N. Y.

That Morgan & Davis, Hardware dealers, Aurora, Ill., have sold out to Fulton & Kennedy.

That N. F. Brown has purchased the Hardware business of Seth Walker & Son, Bethel, Maine.

That D. L. Billings & Co., Stoughton, Mass., have disposed of their Hardware, Stove and Plumbing business to E. T. McNamara of Boston, who will continue it at the old stand.

That Mayer Bros. are building a Hardware store at Bridgewater, N. D.

That Dickinson & Wallace, Mount Victory, Ohio, are erecting a new building for their Hardware business.

That J. M. Welch of St. Joseph, Mo., has bought out the Hardware store of T. W. Stevenson, Bloomington, Ill. Mr. Welch is senior member of the Welch & Parish Hardware Company.

That the Bentonville Hardware Company, with a capital of \$15,000, has been incorporated at Bentonville, Ark., by N. B. Cotton and associates.

That J. M. Kingsbury has started a Bicycle agency at Little Falls, N. Y. He will deal in all the standard makes of wheels.

Exports.

PER BARK ATALANTA, APRIL 29, 1892, FOR PORT ELIZABETH, SOUTH AFRICA.

By W. H. Crossman & Bro.—92 dozen Handles, 55 cases Builders' Hardware, 3 cases Cartridges, 95 cases Hardware, 133 packages Agricultural Implements, 13 bundles Ladders.

By Corner Bros. & Co.—50 cases Agricultural Implements.

By W. E. Peck.—3 cases Agricultural Implements.

By Coombs, Crosby & Eddy Company.—case Hardware, 2 cases Coffee Mills.

By Strong & Trowbridge.—33 dozen Fiber Ware; 100 Churns, 1/2 dozen Money Drawers.

By R. W. Cameron & Co.—1 case Stepladders.

By F. H. Wheeler Company.—9 cases General Hardware.

By Norton & Son.—3 cases Agricultural Implements, 72 Corn Shellers, 3 boxes Iron Pumps, 25 cases Cartridges, 2 cases Cartridges and 50 Bombs, 1 case Forks, 1 case Rakes.

PER BARK ANTONIA SALA, APRIL 29, 1892, FOR PORT NATAL, SOUTH AFRICA.

By Arkell & Douglas.—6 Lawn Mowers, 6 cases Shellers, &c., 45 cases Hardware, 1 case Ladders, 8 packages Wringers, 7 cases Axes, 1 case Saws, 11 cases Hardware, 10 dozen Handles, 2 dozen Churns.

By Coombs, Crosby & Eddy Company.—2 packages Sad Irons, 1 case Hardware, 9 kegs Nails, 1 case Rakes, 1 case Hardware.

By Corner Bros. & Co.—19 cases Agricultural Implements.

FOR DELAGOA BAY.

By Arkell & Douglas.—50 boxes Hatchets.

PER BRIG AQUATIC, MAY 4, 1892, FOR EAST LONDON, SOUTH AFRICA.

By Arkell & Douglas.—66 cases Axes and Hatchets, 17 cases Handles, 54 kegs Nails, 14 cases Scales, 42 packages Hardware, 12 Mangles, 42 Washers, 10 dozen Rakes, 6 packages Shellers, 3 dozen Churns.

By Coombs, Crosby & Eddy Company.—1 dozen Tools, 200 dozen Hardware, 1 case Handles, 6 cases Scales, 1 bundle Handles, 3 dozen Forks, 6 dozen Handles, 6 crates Churns.

PER BRIG SUNSHINE, MAY 4, 1892, FOR EAST LONDON, SOUTH AFRICA.

By Reed & Barton.—2 casks, 3 cases and 4 packages Silver Ware.

By Strong & Trowbridge.—7 cases Handles, 1 case Hardware.

By W. H. Crossman & Bro.—429 cases Agricultural Implements, 18 cases Handles, 65 cases Hardware, 150 cases Nails, 23 kegs Nails, 30 coils Sisal Rope, 1 barrel Plated Ware.

PER BARK HECTOR, MAY 5, 1892, FOR PORT ELIZABETH, SOUTH AFRICA.

By Corner Bros. & Co.—48 cases Agricultural Implements.

By Arkell & Douglas.—225 dozen Axes and Hatchets, 78 packages Hardware, 10 dozen Hoes, 300 dozen Handles, 1 case Sand Paper, 5 dozen Churns, 6 dozen Harrows, 183 kegs Nails, 16 packages Lampware, 9 packages Pumps.

By Coombs, Crosby & Eddy Company.—15 kegs Nails, 7 cases Scales, 6 cases Axes, 6 cases Meat Cutters, 3 cases Tools, 8 racks Churns, 3 cases Mills, 12 kegs Nails, 2 crates Churns, 2 cases Tools, 2 cases Agricultural

Implements, 4 Hoes, 6 dozen Step Ladders, 8 Scales, 45 Ladders, 100 dozen Edge Tools, 10 Shellers.

FOR MOSSEL BAY.

By Arkell & Douglas.—12 Store Trucks, 20 dozen Axes, 4 packages Grindstones and Mills, 36 dozen Handles.

Paints and Colors.

It should be understood that the prices quoted in this column are strictly those current in the wholesale market, and that higher prices are paid for retail lots. The quality of goods frequently necessitates a considerable range of prices.

Between unfavorable weather conditions in nearly all sections and local labor difficulties the distribution of Paints and Colors particularly adapted for house painting has been handicapped more or less, and business at present is hardly as satisfactory as it was at the beginning of the month. Specialties in line of mixed Paints have been rather slower also, and, upon the whole, the market shows less animation than is usually experienced at this season of the year. However, the feeling is prevalent that better things are in store, and, in the absence of any radical change in the markets for base materials or unusual competition for business, values hold quite steady nearly all along the line.

White Lead.—Corroders have made no change in their prices for pure carbonate and fluctuations in values of cheaper varieties do not differ in any marked degree with that which has been common for some time past. In other words, the market remains quite steady and nothing comes to the surface in the way of new developments or rumor calculated to impair confidence in the slightest degree. The distribution during the past week has hardly equaled that of either of the two preceding weeks this month, but the results for the spring season to date are represented as being quite satisfactory and the impression obtains that business will become livelier as soon as temporary adverse conditions are out of the way.

Red Lead.—Domestic product has met with about the usual sale, and in foreign the business is of limited proportions, as for some time past. Prices remain as heretofore and the market quite steady.

Litharge.—Glass makers' grades are still rather slow of movement in the absence of any turn for the better in the glass industry and the higher grade product is barely holding its own. Manufacturers make no special inducements, however, and prices remain quite steady in the face of rather dull trade.

Orange Mineral.—Importers note merely a fair trade in foreign product, and the domestic article remains quiet also, but, such as it is, the business passing is at former prices and the market remains steady.

Zincs.—Except in delivery of old orders the movement of domestic brands of Oxide has been rather slow, but a considerable portion of current production is absorbed, and, while there may be a little accumulation in some quarters, the supply on hand is not sufficient to cause any uneasiness. Prices for the various grades remain steady. In foreign brands there is merely a hand to mouth business, but prices remain very steady.

Colors, &c.—Dry Colors for house painters' use have not met with very brisk sale of late, nor have the staple line of Oil Colors, and competition in other goods than those that are steadied by manufacturers' agreements keeps values somewhat irregular. Tinting Colors put upon the market by the National Lead Company are represented as meeting with very satisfactory sale and giving satisfaction, but to what extent they take the place of old line Colors is not clearly defined. Ready Mixed Paints for house-painting have been rather quiet, but there

is still a good trade in specialties for boat, carriage and car painting, &c., and in Roofing Paints.

Miscellaneous.—The Chalk market is without new feature, and the condition of the market for Whiting and Putty is about the same as outlined in last week's report. In Barytes, Terra Alba, Talc and other Clays there is little if anything more than a routine movement at present, and the business passing is at about the former range of prices.

Oils and Turpentine.

As regards business in Animal and Vegetable Oils there is nothing to note aside from the ordinary routine movement, and neither demand nor offering differ a great deal from the general run previously this month. Conditions bearing upon values contrast in no marked degree with those that have prevailed for several weeks and prices, therefore, show but slight movement. Linseed Oil declined 1¢ and subsequently recovered. Cotton Seed products also eased off a fraction, but subsequently hardened, while Common Olive Oil and Mineral Oils continue more or less in buyers' favor.

Linseed Oil.—In the face of higher cost of both domestic and Calcutta Seed, out-of-town crushers offered Oil in this market at 1¢ decline early in the week. The reason for the break is not clear, but rumor has it that anxiety to realize on the part of some Western firms and resales from second hands at "cut" prices were the disturbing factors. The concession made on Western product was quickly met by city crushers, who dropped their price to 39¢, and for a brief period there were indications of a conflict. However, aggressive action was checked by a restoration of price of Western brands to 39¢ and of city product to 40¢, which prices, it is asserted, leave but a narrow margin of profit on cost at present market value of raw material.

Cotton Seed Oils.—For refined product the market has been somewhat irregular. Prime Summer Yellow, for example, was sold early in the week at from 31½¢ down to 31¢ in good sized blocks, but subsequently improved to 31½¢ on actual sale, and at this writing is held at 32¢. Prime crude weakened to 28½¢, and moved back to 29¢, at which price several hundred barrels were taken, closing firm at the higher rate. The only explanation of the movement in prices is that some anxious holders preferred to realize rather than hold in the face of a quiet market, and that a certain influential interest bid prices up after the cheap lots were secured. Export demand does not improve, but home consumption is said to be quite heavy.

Lard Oil.—A good, steady demand has prevailed. The product of the city presses seems to be closely taken up and supplies that come forward from other sources are placed without much difficulty. Former prices are therefore adhered to, and the market remains quite firm in tone.

Mineral Oils.—Business in this line continues rather unsatisfactory, and more or less accumulation of supplies in manufacturers' hands takes place, under the weight of which prices still rule more or less in buyers' favor.

Miscellaneous.—Common Olive Oil has been selling slowly, and, while not quoted lower, prices are still rather weak. Coconut Oils rather firmer, but without quotable change. Nothing new in the market for Sperm, Whale, Menhaden or other Fish Oils.

Spirits Turpentine.—Under the influence of narrow outlet here and somewhat sharp competition for orders, prices have dropped to 32¢ for ordinary and 32½¢ for machine barrels.

CONTENTS.

	PAGE
The McKnight Corliss Mill Engine. Illus.	161
Colorado Industries	162
Treasury Decisions	164
Opposed to Free Ships	165
The American Society of Mechanical Engineers. Illustrated	165
The Colorado Iron Works	174
The Columbia Steel Windmill. Illustrated	175
The Tharsis Sulphur and Copper Company	175
The Sellers Turning and Boring Lathe for 16-Inch B. L. R. Illustrated	176
Transportation by Water in the United States	179
World's Fair Notes	180
Who the Owners Are	181
The Cast-Iron Pipe Trade	181
The Quicksilver Trade	182
Pittsburgh Building Troubles	182
Maryland Shipbuilding	182
San Francisco News	182
Sensational Railroad Developments	183
The Tennessee Coal, Iron and Railroad Company	183
Anti-Trust Proceedings	183
Mesaba Range Leases	184
Two Mammoth Bridge Girders	184
Trade Publications	184
The Week	185
Editorials:	
Iron and Steel Statistics	186
Reduced Local Freight Rates	186
Standard Methods of Testing Locomotives	186
Net Income of Workmen	187
Knocking Out Foreign Competition	187
Inspecting New England Mill Engines	187
The Iron and Steel Institute	188
Correspondence	188
Iron Ore in New Mexico	189
Personal	189
Washington News	189
Obituary	189
Manufacturing:	
Iron and Steel	190
Machinery	190
Hardware	191
Miscellaneous	192
Trade Report:	
Philadelphia	193
Chicago	193
Cincinnati	194
St. Louis	194
Louisville	195
Detroit	195
Pittsburgh	195
Cleveland	196
New York	197
Metal Market	197
Financial	198
British Iron and Metal Markets	198
Hardware:	
Condition of Trade	199
Notes on Prices	1000
Marcus W. Robinson. Portrait	1002
Trade Topics	1002
Louisville	1002
Penn Hardware Company	1003
Number of Wire Nails to the Pound	1003
Price-Lists, Circulars, &c.	1003
Hardware Store of W. F. McCarroll & Son. Illustrated	1004
Questions in Regard to Net Prices	1006
Trade Items	1006
It is Reported—	1007
Exports	1007
Paints and Colors	1008
The Leonard Kitchen Cabinet. Illustrated	1009
The Babcock Milk and Cream Tester. Ill.	1009
Eave Trough Ends. Illustrated	1009
Barler's Shine Cabinet. Illustrated	1010
The Cathedral Gong Money Drawer. Illus.	1010
The Telephone Mill. Illustrated	1010
The Curtis Combination Pedal. Illustrated	1011
Goulds' Handy Knapsack Spray Pump. Ill.	1011
Advance Keen Cutter No. 423. Illustrated	1011
Current Hardware Prices	1012
Current Metal Prices	1018

The Leonard Kitchen Cabinet.

In the accompanying illustration we present an open view of what is known as the Leonard Cleanable Refrigerator Work Table and Kitchen Cabinet, which is being manufactured and placed upon the market by the Grand Rapids Refrigerator Com-

pany. tion has fallen through, as no evidence could be found that would warrant him in bringing a suit.

The Babcock Milk and Cream Tester.

Porter Blanchard's Sons Company, Nashua, N. H., are putting this milk and



The Leonard Kitchen Cabinet.

pany, Grand Rapids, Mich. The object of this device is to concentrate the kitchen utensils necessary in cooking operations, that there will result a saving of both time and labor in the execution of work in the kitchen. The flour bins are said to be of the latest patent, and that it is only necessary to turn the crank and the flour is in the drawer below. One bin holds 50 pounds and the other 25 pounds. The three large drawers are for oatmeal, corn meal and sugar. The drawers in the wings are intended for salt, pepper and spices, while the ones below are intended for kitchen utensils. A place for flavoring extracts close beside the bottle rack is a feature of the cabinet. The partitions between the bottles are movable, thus permitting the reception of bottles of any size. The shelves in the wings are provided with ledges so that pans, basins and other open vessels can be rested on edge. It will be noticed by an inspection of the cut that one of the spaces in the wings is designed for articles which hang up. Kitchen crockery may be stored over the large drawers if desired. There is also a place just over the flour bin for cook books. The manufacturers state that they do not furnish all the kitchen utensils shown in the engraving, but supply the slate molding board and the two flour bins. The folding cabinet is offered the trade without the refrigerator, and the statement is made that it will fit any common kitchen table. The cabinet here illustrated is known as No. 37-K, is 77 inches in width when open, 23 inches deep and 88½ inches high.

The investigation by the District Attorney of Chicago into the coal combina-

tion has fallen through, as no evidence could be found that would warrant him in bringing a suit. cream tester on the market for the use of dairymen, as shown in the accompanying illustration. After securing a sample of milk in the bottle, which represents as nearly as possible the whole lot of milk



The Babcock Milk and Cream Tester.

from which it is taken, and adding acid according to the most improved formula, the mixture is ready for testing. This is done by putting the bottles in the machine and whirling them. An even number of full bottles are whirled at the same time,

and are placed in the wheel in pairs opposite to each other, so as to preserve the balance of the machine. When all of the test bottles are placed in the apparatus the cover is put on the tank and the machine is turned at such a rate that the wheel carrying the bottles will make from 600 to 800 revolutions per minute; this motion being kept up for six or seven minutes. The test bottles containing the mixture of milk and acid may be placed in the machine directly after the acid is added, or they may stand several hours without harm. The machine is recommended because of the uncertainty, injustice and loss attending the present methods of buying and selling milk. The point is made by the manufacturers that the farmer who takes pains with his stock and feed and produces rich milk soon finds that it brings no more at the creamery than is paid for poor milk, which may weigh or measure just as much. The buyer of milk has no standard of quality, and relies on securing an average richness by mixing the good with the poor, resulting in both producers and buyers being dissatisfied. In the use of this machine the object is to determine the exact quantity of cream produced by each cow, after which the unprofitable ones in the herd may be weeded out.

Eave Trough Ends.

In the accompanying illustration is shown an article that will be of interest to the roofing and tinning trade. It is an eave trough end, manufactured by Bowers,



Bowers, Galpin & Co.'s Eave Trough Ends.

Galpin & Co., Binghamton, N. Y. The features of this article are so clearly shown in the illustration that a very brief description will suffice. The ends are cut with a die, and the edges turned with a press, a special advantage of this method of manufacture being that the ends are in the form of a true circle. The ends are made 4, 5 and 6 inches, either in galvanized

iron, tin or terne plate, and packed 100 in a box.

Steam pipe for heating purposes is about to be laid in the streets of Philadelphia, west side.

Barler's Shine Cabinet.

The Huette-Barler Mfg. Co., 111-113 Lake street, Chicago, are putting on the market an ingenious and complete blacking outfit, of which the accompanying



Fig. 1.—Barler's Shine Cabinet.

illustrations, Figs. 1 and 2, show its condensed form when closed and of the arrangement of the contents, with rest for shoe, when open. The cabinet is very compact and of a form to give it unusual strength, and is described as a folding cast metal cabinet of artistic design, beautifully finished in electro-copper bronze, nickel and japan, intended to be fastened to wall or door casing, and containing all the necessary brushes and blacking required for gentlemen's, ladies' and children's shoes.

Opened for use it projects 15 inches from wall, terminating at its free end in a secure and firm foot rest of new pattern, and is capable, it is stated, of sustaining a weight of more than 150 pounds. In this position the contents are most conveniently arranged. A blacking box is located toward the front and held firmly in position by a thumb screw; immediately back of this in a separate apartment is the brush and dauber, while in a neat sheet-metal case, fastened to the back of cabinet and directly above brushes, is a bottle of ladies' shoe dressing. A place for the refractory button hook that is so often miss-



Fig. 2.—Inside of Barler's Shine Cabinet.

ing when wanted has not been overlooked, and the whole is a blacking device equally adapted to the use of all members of the family. No soiling of fingers, no damage to furniture, no overturning of liquid polish to ruin carpets, are some of the advantages claimed for it. It may be used in the business man's office and in the bedroom or bathroom, its general design adapting it for use in various places. It

can be located at any convenient position from the floor, as it is not dependent on extra braces or legs for support.

The manufacturers claim this cabinet is an ornament in a room, being finished in a superior manner to harmonize with the best interior decorations, and that instead of putting it in an out of the way place, as has been customary with blacking arrangements, a purchaser will locate same where

The Cathedral Gong Money Drawer.

The John M. Waddel Mfg. Company, Greenfield, Ohio, are introducing a money drawer, as illustrated herewith. The drawer is 13 x 16 inches, weighing 9 pounds. It is provided with eight sliding coin hoppers and four tills for bills. The drawer has six castings and one spring,



The Cathedral Gong Money Drawer.

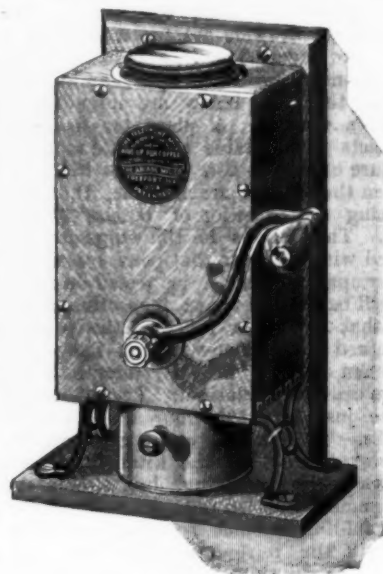
it is most convenient to be used, and thus can do the work in less time than it takes to hunt up blacking and brushes in the old way. The cabinets are put up in a most complete manner, with everything ready for immediate use, even to the screws to fasten it into position.

The manufacturers state that every one contains a first quality bristle brush, best metal handle dauber, large box of fine French blacking and a bottle of the very best ladies' shoe dressing that can be had. Nothing has been left undone to make it

while the cathedral gong, it is stated, is the same as used in \$25 clocks. The drawer slides from the bottom and can be operated on the counter. This drawer has five latches and two catches, directly under the drawer pull, susceptible of 33 changes, a change being made in the combination by turning a latch. The advantages claimed for this drawer are as follows: Small size, light weight, large number of money compartments, small number of castings and superior gong.

The Telephone Mill.

Arcade Mfg. Company, Freeport, Ill., are introducing this mill, as illustrated herewith. It is made of hard wood, highly finished, nickel trimmed, and is so arranged as to fasten to a table, shelf or wall. It holds 1 pound of coffee, and is easily regulated, it is stated, to pulverize,



The Telephone Mill.

if desired. It is provided with their recently patented self-sharpening double grinders, which they assert makes it a fast-grinding mill. It is designed for grinding coffee and spices.

a strictly first class article throughout, and at a moderate price.

The new purchaser of the Rockland forges, near Reading, Pa., which were founded before the Revolution, and were abandoned many years ago, claims to have discovered that the old cinder heap is 57 per cent. iron, and is worth several thousand dollars.

The Curtis Combination Pedal.

The Reed & Curtis Machine Screw Company, Worcester, Mass., are offering this article, as illustrated in Figs. 1 and 2. It

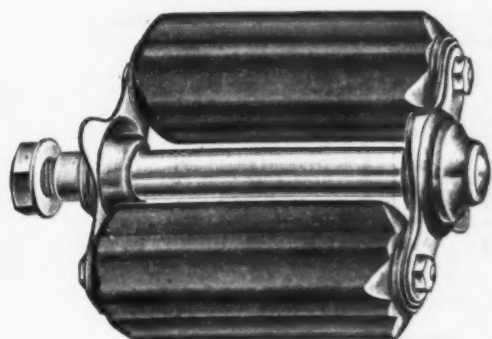


Fig. 1.—The Curtis Combination Pedal.

is stated that the pedal is absolutely dust proof; all wearing parts are hardened and ground; the very best balls are used and



Fig. 2.—Rat Trap Pedal.

that the ends are pressed from the best steel. Fig. 3 shows an enlarged view of the rat trap plate, with screws and nuts

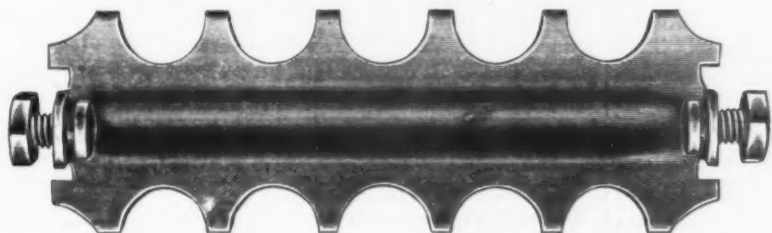


Fig. 3.—Rat Trap Plate.

as furnished, while Fig. 4 is a cut of the pedal end, showing how any pedal end may be filed so as to use their rat-trap

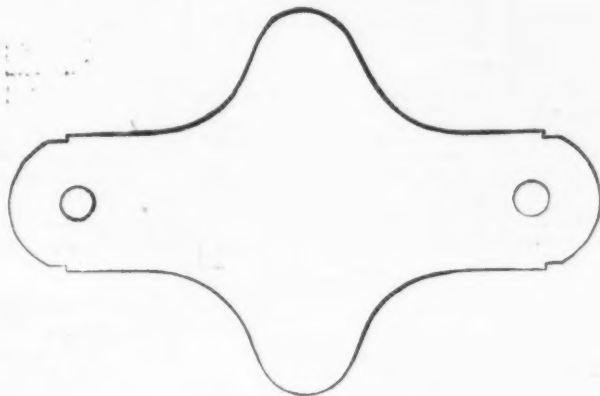
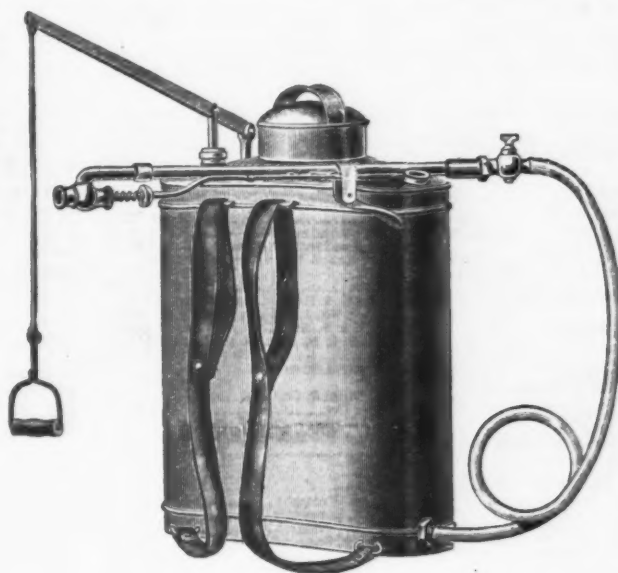


Fig. 4.—Pedal End.

plate. The manufacturers furnish the rubber pedal with ends milled for the rat trap plates when so ordered, so that the plates may be put in place in a few minutes.

Goulds' Handy Knapsack Spray Pump.

The Goulds Mfg. Company, 16 Murray street, New York, and Seneca Falls, N. Y., are offering the trade this pump, as shown in the accompanying illustration. The pump itself is made entirely of brass and copper, with rubber ball valves and metal plunger. It is stated that these parts are easily accessible, and therefore can be readily examined and repaired; also that



Goulds Handy Knapsack Spray Pump.

the pump is so arranged and stayed in the reservoir that it is capable of doing long and continuous service, and will not easily get out of order. The reservoir is made of heavy copper, and will hold about five gallons of liquid, although it will be made

discharge hose, vermored nozzle and lance for a degorger. This spray pump is designed for orchard, vineyard or field service.

Advance Keen Cutter No. 422.

The Chillicothe Mfg. Company, Chillicothe, Ohio, are introducing a center-hold coffee mill, as shown herewith. The long stem projecting from the top of the cover

is cast in one piece, and is designed as a solid hold for all purposes. It is claimed that the mill can be held steady, and that it cannot "wobble." They impress this statement on the memory by the following lines:

If the center you will grip,
It will have no chance to slip.

It is stated that the guiding parts are first-class, and do their work rapidly and easily. The mountings are copper bronzed



Advance Keen Cutter No. 422.

and lacquered, and the adjusting nuts large and easily regulated by the operator. It has a round tin drawer with spring sides, while the box is 6 x 6 inches, 5 inches high, made of No. 1 poplar, varnished with genuine varnish.

There are 4000 Japanese on the Pacific Coast and more are coming. They are said to work for less money than Chinamen.

larger upon special orders. The discharge is at the bottom, and the pump can therefore be entirely drained of the liquid.

Clamps—	
R. L. Tool Co.'s Wrought Iron.....	25¢
Adjustable, Cincinnati.....	15¢10¢
Adjustable, Hammers.....	15¢
Adjustable, Stearns.....	30¢40¢10¢
Stearns' Adjustable Cabinet and Cor- ner.....	30¢40¢10¢
Cabinet, Sargent's.....	60¢10¢
Carriage Makers', Sargent's.....	70¢10¢
Carriage Makers', P. S. & W. Co., 40¢10¢	
Herbert Mfg. Co., 40¢10¢40¢10¢	
Warner's.....	40¢10¢40¢10¢
Saw Clamps, see Vices, Saw Filers.	
Carpenters', Cincinnati.....	25¢10¢
Cleavers.	
Butchers'.	
Bradley's.....	25¢30¢
L. & J. White.....	20¢5¢
Beatty's.....	40¢40¢5¢
New Haven Edge Tool Co.'s.....	40¢
P. S. & W. Co., 35¢10¢35¢10¢	
Poster Bros.....	40¢40¢5¢
Schulte, Loboff & Co.....	40¢40¢5¢
Clips—	
Norway, Axle, 1/4 & 5-16.....	55¢5¢5¢
2nd grade Norway Axle, 1/4 & 5-16.....	65¢5¢
Superior Axle Clips.....	60¢40¢70¢
Norway Spring Bar Clips, 5-16.....	50¢5¢5¢
Wrought-Iron Pellice Clips.....	5¢
Steel Pellice Clips.....	5¢
Baker Axle Clips.....	25¢
Cloth and Netting, Wire—See Wire, &c.	
Cockeyes.....	
50¢	
Cocks, Brass.	
Hardware list.....	50¢25¢
Coffee Mills—See Mills, Coffee	
Collars, Dog, &c.	
Medford Fancy Goods Co.....	40¢10¢
Embossed, Gift, Pope & Stevens' list.....	30¢10¢
Leather, Pope & Stevens' list.....	40¢
Brass, Pope & Stevens' list.....	40¢
Chapman Mfg. Company.....	50¢10¢60¢
Combs, Curry.	
Fitch's.....	50¢10¢50¢10¢10¢
Rubber, per doz \$10.00.....	50¢
American Curry Comb Co., Net prices	
Compasses, Dividers, &c.—	
Compasses, Callipers, Dividers, 70¢70¢10¢	
Bemis & Call Co.'s	
Dividers.....	60¢25¢
Compasses & Callipers.....	50¢25¢
Wing and Inside or Outside.....	50¢25¢
Double.....	60¢
(Call's Pat. Inside).....	50¢
Excelsior.....	50¢
J. Stevens & Co.'s.....	35¢10¢
Starrett's	
Spring Callipers and Dividers.....	25¢10¢
Lock Callipers and Dividers.....	25¢
Combination Dividers.....	25¢
Coopers' Tools—See Tools, Coopers'.	
Cord—	
Sash.	
Common.....	10¢ 10¢ 11¢
Patent, good quality.....	15¢ 15¢ 15¢
White Cotton Braided, 60¢, 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000	

Hangers—

Barn Door, old patterns.....	60¢10¢10¢70¢
Barn Door, New England.....	60¢10¢10¢70¢
Samson Steel Anti-Friction.....	55¢
Oreans Steel.....	55¢
Hamilton Wrought Wood Track.....	55¢
U. S. Wood Track.....	55¢
Champion.....	55¢
Bilder and Wooster, Medina Mfg. Co.'s.....	70¢
Pat.....	70¢
Jimax Anti-Friction.....	55¢
Ultimax Anti-Friction for Wood Tracks.....	55¢
Zeuth for Wood Track.....	55¢
Seed's Steel Arm.....	55¢
Challenge, Barn Door.....	55¢
Sterling.....	55¢
Victor, No. 1, \$15.00; No. 2, \$16.50; No. 3, \$18.00.....	50¢25¢
Cheritree.....	50¢10¢
Kidder's.....	40¢10¢50¢
Boss.....	60¢10¢
Best Anti-Friction.....	60¢10¢
Duplex Wood Track.....	60¢10¢
Terry's Pat., 7/8 in. x 1/2 in., \$10.00; 5 in. \$12.00.....	50¢10¢
Terry's Steel Anti-Friction Leader.....	50¢10¢
Terry's Steel Anti-Friction Ideal.....	50¢10¢
Orenk's Patent, Steel Covered.....	50¢5¢
Wood Track Iron Clad, 7/8 ft. 10¢.....	50¢

Carrier Steel Anti-Friction.....	50¢10¢
Architect, 7/8 set \$6.00.....	30¢
Melippe.....	30¢10¢
Felix, 7/8 set \$4.50.....	30¢
Richards.....	30¢50¢10¢
Lane's Standard.....	50¢50¢55¢
Lane's Standard.....	50¢50¢55¢
Lane's Parlor.....	40¢
Ball Bearing Door Hanger.....	20¢10¢25¢10¢
Warner's Pat.....	20¢10¢25¢10¢
Stearns' Anti-Friction.....	20¢10¢25¢10¢
Stearns' Challenge.....	25¢10¢25¢10¢
Faultless.....	40¢40¢55¢
American, 7/8 set \$6.00.....	30¢10¢
Bilder & Wooster, No. 1, \$2.00; No. 2, 75¢.....	40¢
Paragon, Nos. 1, 2 and 3.....	40¢10¢
Cincinnati.....	25¢10¢
Paragon, Nos. 5, 5 1/2, 7 and 8.....	20¢10¢
Crecent.....	60¢50¢10¢
Nickel Cast Iron.....	50¢
Nickel, Malleable Iron and Steel.....	40¢
Scranton Anti-Friction Single Strap.....	35¢
Wild West, 4 in. Wheel, \$15.00; 5 in. Wheel, \$21.00.....	45¢
Star.....	40¢10¢40¢10¢55¢
May.....	50¢55¢50¢10¢
Barry, \$6.00.....	50¢
Interstate.....	50¢
Magie.....	40¢
Pendulum, Payson's.....	40¢
Moody.....	45¢

Harness Snaps—See Snaps.

Staples—

American Axe and Tool Co.	
Blood's.....	
Hunt's.....	
Hurd's.....	
Mann's.....	
Peck's.....	
Underhill's.....	40 & 10
Buffalo Hammer Co.....	50 & 55
Fayette R. Plumb.....	
C. Hammond & Son.....	
Kelly's.....	
Sargent & Co.....	
P. S. & W. Co.....	
Ten Eyck Edge Tool Co.....	
Collins.....	
Schulte, Loboff & Co.....	50¢50¢55¢

Hay and Straw Knives—See Knives.

Hinges—

Blind Hinges—

Farker.....	75¢25¢
Huffer.....	60¢
Clark's, Nos. 1, 3, 5, 40 and 60.....	75¢10¢55¢90¢
Clark's Mortise Gravity.....	60¢
Sargent's Nos. 1, 3, 5, 11, 13.....	75¢10¢55¢10¢55¢
Sargent's, No. 12.....	75¢10¢55¢10¢55¢
Reading's Gravity.....	75¢10¢75¢10¢55¢
Shepard's.....	75¢10¢
Noiseless.....	75¢10¢
Ningara.....	80¢
Buffalo.....	80¢
Clark's Genuine Pattern.....	80¢
O. S. Lull & Porter.....	75¢
Acme, Lull & Porter.....	75¢
Queen City Reversible.....	70¢10¢55¢75¢
Clark's Lull & Porter, Nos. 0, 1, 1 1/2, 2, 2 1/2, 3.....	75¢10¢25¢
North's Automatic Blind Fixtures, No. 2, for Wood, \$9.00; No. 3, for Brick, \$11.50.....	10¢

Gate Hinges—

Western.....	7/8 set \$4.40, 60¢
N. E. Reversible.....	7/8 set \$7.00, 55¢
F. E. Reversible.....	7/8 set \$5.20, 55¢10¢
Clark's, Nos. 1, 2, 3.....	60¢10¢55¢
N. Y. State.....	7/8 set \$5.00, 55¢10¢
Automatic.....	7/8 set \$12.50, 50¢
Shepard's.....	60¢10¢55¢

Spring Hinges—

Geer's Spring and Blank Butts.....	40¢
Union Spring Hinge Co.'s list, March 1892.....	25¢
Barker's Double Acting.....	25¢
Union Mfg. Co.....	25¢
Bonner's.....	25¢
Buckman's, Gen. and Star.....	25¢
Chicago.....	30¢
Bardsley's Patent.....	40¢
Acme.....	30¢
U. S.....	25¢10¢
Empire and Crown.....	20¢
Hero and Monarch.....	20¢
American, Gen. and Star.....	20¢
Oxford.....	20¢
Wiles.....	10¢
Devore's.....	40¢
Rox.....	40¢
Royal.....	60¢
Beffable.....	60¢
Champion.....	60¢
Stearns.....	50¢10¢
Samson, 7/8 gross.....	\$14.00

Wrought Iron Hinges.

List February 14, 1891.....	
Strap and T.....	50¢10¢55¢10¢55¢

Corrugated Strap & T.....	50¢50¢10¢
Screw Hook and Strap.....	14 to 30 in., 7/8 in., 3/4 in., 1/2 in., 1/4 in., 3/16 in., 1/8 in., 1/16 in., 1/32 in., 1/64 in., 1/128 in., 1/256 in., 1/512 in., 1/1024 in., 1/2048 in., 1/4096 in., 1/8192 in., 1/16384 in., 1/32768 in., 1/65536 in., 1/131072 in., 1/262144 in., 1/524288 in., 1/1048576 in., 1/2097152 in., 1/4194304 in., 1/8388608 in., 1/16777216 in., 1/33554432 in., 1/67108864 in., 1/134217728 in., 1/268435456 in., 1/536870912 in., 1/1073741824 in., 1/2147483648 in., 1/4294967296 in., 1/8589934592 in., 1/17179869184 in., 1/34359738368 in., 1/68719476736 in., 1/137438953472 in., 1/274877906944 in., 1/549755813888 in., 1/1099511627776 in., 1/2199023255552 in., 1/4398046511104 in., 1/8796093022208 in., 1/17592186044416 in., 1/35184372088832 in., 1/70368744177664 in., 1/140737488355328 in., 1/281474976710656 in., 1/562949953421312 in., 1/1125899906842624 in., 1/2251799813685248 in., 1/4503599627370496 in., 1/9007199254740992 in., 1/18014398509481984 in., 1/36028797018963968 in., 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Nails.

Hickory.....\$0.10@0.12@10¢
Lignumvite.....\$0.10@0.12@10¢
B. & L. Block Co., Hickory & L. V.
\$0.08@0.10

Mattlocks, Regular List.
60¢10¢00¢010¢10¢

Measures—
Standard Fibreware, No. 1, peck,
dosen, \$4; ¼-peck, \$3.50.

Meat Cutters—See Cutters, Meat.

Menders, Harness—
Per doz.....\$2.00

Mills.

Coffee—
Box and Side, List Jan. 1, 1889, 60¢00¢10¢
Net prices are often made which are
lower than above discount.
American Enterprise Mfg Co.\$0.10@0.30¢
The Swift, Lane Bros.....\$0.10¢

Mining Knives—See Knives,
Mining.

Molasses Gates—See Gates, Mo-
lasses.

Money Drawers—See Drawers,
Money.

Mowers, Lawn.

Philadelphia.....\$0.10¢
Pennsylvania and Continental.....\$0.10¢
New Model and Excel-lor.....60¢00¢10¢
Other Machines.....60¢10¢10¢75¢

Muzzles—
Safety.....\$ dos, \$3.00, 25 ¢

Nails.
Cut and Wire. See Trade Report.
Wire Nails, Papered.
Association List, Apr. 11, '92 \$0.10¢10¢10¢
Tack Mfr's' list.....70¢70¢10¢
Wire Nails, Standard Penny.
Card June 1 '89 base.....\$1.95 @ \$2.00

Horse—
Nos. 6 7 8 9 10
American.....\$4 54 84 84 14 net
Austrian.....\$24 24 24 24 24

Clinton, Fin-19 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
\$24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24

Lyra.....19 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Snowden.....19 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Putnam.....\$24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24

1000 lb in year 15¢
Vulcan.....\$24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24
Northwest.....\$24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24 24

A. O.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
O. B.-K.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
Hand S.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
Champion.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢

Sarnano.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
Champion.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢

Capwell.....19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Anchor.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
Western.....25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢ 25¢
Empire Bronzed.....14 ¢

Picture—
Brass Head, Sargent's list.....\$0.10¢10¢10¢
Brass Head, Combination list.....\$0.10¢10¢10¢
Porcelain Head, Sargent's list.....\$0.10¢10¢10¢
Woods' Head, Combination list.....\$0.10¢10¢10¢
Wilson Patent.....\$0.10¢10¢10¢

Mail Pullers.—See Pullers, Mail.

Mail Sets.—See Sets, Mail.

Nut Crackers.—See Crackers, Nut.

Nuts—List Dec. 18, 1889.

Sourc. Hex.
Hot Pressed.....\$5.50 off list.
Cold Punched.....\$5.00 off list.
In packages of 100 b, add 1-10¢
net; in packages less than 100 b, add
¼ ¢ b, net.

Oakum—
Best or Government.....\$ 64¢(7)¢
U. S. Navy.....\$ 64¢(7)¢
Navy.....\$ 64¢(7)¢

Oilers—
Zinc and Tin.....65¢10¢70¢5¢
Brass and Copper.....60¢10¢50¢10¢5¢
Malleable, Hammers' Improved, No. 1,
\$3.50; No. 2, \$4.00; No. 3, \$4.40
10¢10¢10¢
Malleable, Hammers, Old Pattern, same
list.....40¢
Prior's Pat. or "Paragon" Zinc,
60¢10¢10¢
Prior's Pat. or "Paragon" Brass.....50¢
Olstead's Tin and Zinc.....50¢
Olstead's Brass and Copper.....50¢
Broughton's Zinc.....60¢
Broughton's Brass.....50¢
Gem F. D. & Co.,
Steel, Draper and Williams.....50¢

Openers, Can.
Messenger's Comet.....\$ dos \$3.00, 25¢
American.....\$ gross \$2.75@3.00
Duxley.....\$ dos \$2.50, 15¢35¢
Lyman.....\$ dos \$2.75, 20¢
No. 4 French.....\$ dos \$2.25, 55¢60¢
No. 5 Iron Handle.....\$ gr \$2.00, 45¢60¢
Eureka.....\$ dos \$2.50, 10¢
Sardine Scissors.....\$ dos \$2.75@3.00
Star.....\$ dos \$2.75
Sprague, No. 1, \$2.00 2, \$2.25 3, \$2.50
60¢10¢10¢

Excelsior No. 1 \$2.50; No. 2, \$1.50.....40¢
World's Best, W gross, No. 1, \$12.00,
No. 2, \$24.00; No. 3, \$36.00.....50¢10¢
Universal, W dos \$3.00.....\$2.50
Domestic, W dos \$2.50.....50¢
Champion, W dos \$2.00.....50¢

Packing, Steam—
Standard.....70¢70¢10¢
Extra.....00¢00¢00¢
N. Y. B. & P. Co., Standard.....50¢
N. Y. B. & P. Co., Empire.....50¢
N. Y. B. & P. Co., Salamander.....25¢
Jenkins' Standard, W 80¢, 25¢@25¢

Miscellaneous—
American Packing.....10¢11¢
British Packing.....15¢14¢
Italian Packing.....15¢14¢
Cotton Packing.....15¢17¢
Jute.....70¢

Galvanized Iron—

Quarts 10 13 14
Hill's Light Weight, W dos, \$2.75 3.00 3.25
Hill's Heavy Weight, W da. 3.00 3.25 3.75
Helwig's.....3.50 2.75 3.00
Sidney Shepard & Co.....3.25 2.85 3.05
Iron Clad.....3.50 2.75 3.00
Fire Buckets.....2.75 3.25 3.50
Buckets, see Well Buckets.

Indurated Fibre Ware—25¢

Star Falls, 12 qt.....\$ dos \$5.40
Stable and Milk, 14 qt.....\$ dos \$6.00
Fire Falls, deep.....\$ dos \$5.40
" round bottom.....\$ dos \$7.80

Standard Fibre Ware—Plain, Dec'd

Water Falls, 12 qt., per doz.....\$4.00 \$4.50
Dairy Falls, 14 qt., per doz.....4.50 5.00
Fire Falls, No. 1, 12 qt., per doz.....4.50 5.00
Fire Falls, No. 2, 14 qt., per doz.....5.00 5.50
Sugar Falls.....6.00 6.50
Bugsy Falls.....5.00
Bugsy Jars (dark).....4.00 4.50
Slip Jars (dark).....8.00 9.00
Chamber Falls, 14-qt.....6.50 7.50

Fans.

Dripping.

Small size.....\$ 64¢
Large size.....\$ 64¢
Silver & Co. (Covered).....40¢

Fry—
Standard List:

No.....0 1 2 3 4
\$ dos.....\$3.00 \$4.75 \$4.25 \$4.75 \$5.25
No.....5 6 7 8 9
\$ dos.....\$6.00 \$7.00 \$8.00 \$9.00
Polished, regular goods.....75¢75¢10¢
Acme Fry Fans.....60¢10¢

Dust—
Steel Edge, No. 1.....\$ dos \$1.75

Paper and Cloth—

Sand and Emery—
List April 19, 1889.....50¢60¢10¢
Sibley's Emery and Orocous Cloth.....30¢

Parers.

Apple.

Advance.....\$ dos \$4.75
Baldwin.....\$ dos 5.25
Bonanza.....each 5.00
Daisy.....\$ dos 4.00
Dandy.....each 7.50
Eclipse.....\$ dos 4.25
Eureka, 1888.....each 16.00
Family Bay State.....\$ dos 13.00
Favorite.....\$ dos 5.00
Gold Medal.....\$ dos 4.00
Ideal.....\$ dos 4.00
Improved Bay State.....\$ dos 27.00 @ 30.00
Little Star.....\$ dos 4.50
Monarch.....\$ dos 15.50
New Lightning.....\$ dos 5.50
Orion.....\$ dos 4.00
Penny.....\$ dos 4.00
Perfection.....\$ dos 4.00
Pomona.....\$ dos 4.00
Rocking Table.....\$ dos 6.00
Turn Table.....\$ dos 4.50
Victory.....\$ dos 13.00
Wave.....\$ dos 4.00
White Mountain.....\$ dos 4.00
75.....\$ dos 4.25
78.....\$ dos 7.00

Potato—
White Mountain.....\$ dos \$4.50
Ashland combination.....\$ dos \$5.50
Booster.....\$ dos \$13.50
Saragosa.....\$ dos \$5.50

Penels—
Faber's Carpenters'.....high list 50¢
Faber's Round G

Atkins' Circular Shingle & Heading, 50' x 10' x 1/2"	Atkins' Silver Steel Diamond X Cuts, 1/2" foot 70'	Atkins' Special Steel Dexter X Cuts, 1/2" foot 50'	Atkins' Special Steel Diamond X Cuts, 1/2" foot 30'	Atkins' Champion and Electric Tooth X Cuts, 1/2" foot 30'	Atkins' Hollow Back X Cuts, 1/2" foot 30'	Atkins' Mulay, Mill and Drag, 1/2" foot 40'	Atkins' One-Man Saw, with handles, 1/2" foot 40'	Peace Circular and Mill, 1/2" foot 40'	Peace Hand Panel and Rip, 1/2" foot 40'	Peace Cross Cuts, 1/2" foot 40'	Richardson's Circular and Mill, 1/2" foot 40'	Richardson's X Cuts, 1/2" foot 40'	Richardson's Hand, 1/2" foot 40'	C. K. Jennings & Co., Hand, Panel and Rip, 1/2" foot 40'	Hack Saws—Griffin's, complete, 1/2" foot 40'	Griffin's Hack Saw, Blades, 1/2" foot 40'	Star Hack Saws and Blades, 1/2" foot 40'	Eureka and Crescent, 1/2" foot 40'	Lester, complete, \$10.00, 1/2" foot 40'	Rogers, complete, \$4.00, 1/2" foot 40'	Barnes' Builders' and Cab. Makers' 1/2" foot 40'	Barnes' Scroll Saw Blades, 1/2" foot 40'	New Frames—See Frames, Saw, Saw Nuts—See Saws, Saw, Saw Tools—See Tools, Saw, Saws—Hatch, Counter, No. 171, good quality, 1/2" foot 40'	Hatch, Tea, No. 161, 1/2" foot 40'	Union Platform, Plain, 1/2" foot 40'	Union Platform, Striped, 1/2" foot 40'	Chattillon's Grocers' Trip Scales, 1/2" foot 40'	Chattillon's Eureka, 1/2" foot 40'	Chattillon's Favorite, 1/2" foot 40'	Family, Turnbills, 1/2" foot 40'	Riehle Bros.' Platform, 1/2" foot 40'	Beam Scales—See Scales, Scale Scales, 1/2" foot 40'	Scrapers—Adjustable Box Scraper (R. & L. Co.), 1/2" foot 40'	Box, 1 Handle, 1/2" foot 40'	Box, 2 Handle, 1/2" foot 40'	Defiance Box and Ship, 1/2" foot 40'	Foot, 1/2" foot 40'	Ship, B. I. Tool Co., 1/2" foot 40'	Screen Window and Door Frames—See Frames, Screen Drivers—See Drivers, Screen Drivers, 1/2" foot 40'	Bench and Hand—Bench, Iron, 1/2" foot 40'	Bench, Wood, Beech, 1/2" foot 40'	Bench, Wood, Hickory, 1/2" foot 40'	Hand, Wood, 1/2" foot 40'	Hand, Grand Rapids, 1/2" foot 40'	Coach and Lag, Gimlet Point, 1/2" foot 40'	Coach and Lag, Gimlet Point, 1/2" foot 40'	Bed, 1/2" foot 40'	Hand Rail, Sargent's, 1/2" foot 40'	Hand Rail, H. & F. Mfg. Co., 1/2" foot 40'	Hand Rail, Am. Screw Co., 1/2" foot 40'	Jack Screws, Millers Falls, 1/2" foot 40'	Jack Screws, P. & W., 1/2" foot 40'	Jack Screws, Sargent's, 1/2" foot 40'	Jack Screws, Stearns', 1/2" foot 40'	Cork—Humason & Beckley Mfg. Co., 1/2" foot 40'	Williamson's, 1/2" foot 40'	Howe Bros. & Hulbert, 1/2" foot 40'	Machine—Flat Head, Iron, 1/2" foot 40'	Round Head, Iron, 1/2" foot 40'	Wood—List January 1, 1891, 1/2" foot 40'	Flat Head Iron, 1/2" foot 40'	Round Head Iron, 1/2" foot 40'	Round Head Brass, 1/2" foot 40'	Round Head Bronze, 1/2" foot 40'	Round Head Bronze, 1/2" foot 40'	Bowers' Drive Screws, 1/2" foot 40'	Scroll Saws—See Saws, Scroll Saws, 1/2" foot 40'	Scythes—Grain, 1/2" foot 40'	Grass, 1/2" foot 40'	Scythe Snaths—See Snaths, Scythe Snaths, 1/2" foot 40'	Awl and Tool—Allen's Seta, Awl and Tools, 1/2" foot 40'	No. 30, 1/2" foot 40'	Pray's Adj. Tool Hds., Nos. 1, 1 1/2, 2, 1 1/2, 3, 1 1/2, 4, 1 1/2, 5, 1 1/2, 6, 1 1/2, 7, 1 1/2, 8, 1 1/2, 9, 1 1/2, 10, 1 1/2, 11, 1 1/2, 12, 1 1/2, 13, 1 1/2, 14, 1 1/2, 15, 1 1/2, 16, 1 1/2, 17, 1 1/2, 18, 1 1/2, 19, 1 1/2, 20, 1 1/2, 21, 1 1/2, 22, 1 1/2, 23, 1 1/2, 24, 1 1/2, 25, 1 1/2, 26, 1 1/2, 27, 1 1/2, 28, 1 1/2, 29, 1 1/2, 30, 1 1/2, 31, 1 1/2, 32, 1 1/2, 33, 1 1/2, 34, 1 1/2, 35, 1 1/2, 36, 1 1/2, 37, 1 1/2, 38, 1 1/2, 39, 1 1/2, 40, 1 1/2, 41, 1 1/2, 42, 1 1/2, 43, 1 1/2, 44, 1 1/2, 45, 1 1/2, 46, 1 1/2, 47, 1 1/2, 48, 1 1/2, 49, 1 1/2, 50, 1 1/2, 51, 1 1/2, 52, 1 1/2, 53, 1 1/2, 54, 1 1/2, 55, 1 1/2, 56, 1 1/2, 57, 1 1/2, 58, 1 1/2, 59, 1 1/2, 60, 1 1/2, 61, 1 1/2, 62, 1 1/2, 63, 1 1/2, 64, 1 1/2, 65, 1 1/2, 66, 1 1/2, 67, 1 1/2, 68, 1 1/2, 69, 1 1/2, 70, 1 1/2, 71, 1 1/2, 72, 1 1/2, 73, 1 1/2, 74, 1 1/2, 75, 1 1/2, 76, 1 1/2, 77, 1 1/2, 78, 1 1/2, 79, 1 1/2, 80, 1 1/2, 81, 1 1/2, 82, 1 1/2, 83, 1 1/2, 84, 1 1/2, 85, 1 1/2, 86, 1 1/2, 87, 1 1/2, 88, 1 1/2, 89, 1 1/2, 90, 1 1/2, 91, 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CURRENT METAL PRICES.

MAY 18, 1892.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

IRON AND STEEL.

Bar Iron from Store.

Common Iron:	
1 to 2 in. round and square.	1.90 @ 2.00
1 to 6 in. x 3/4 to 1 in.	
Refined Iron:	
1 to 2 in. round and square.	2.00 @ 2.20
1 to 4 in. x 3/4 to 1 1/4 in.	2.00 @ 2.20
4 1/2 to 6 in. x 3/4 to 1 in.	2.10 @ 2.30
1 to 6 in. x 1 1/4 and 5-16.	2.20 @ 2.40
Rods—5/8 and 1 1/8 round and sq.	2.30 @ 2.50
Bands—1 to 6 x 3-16 to No. 12.	2.30 @ 2.50
"Burden Best" Iron, base price.	3.00
Burden's "H. B. & S." Iron,	
base price.	2.80
"Ulster"	3.00
Norway Bars	3.75 @ 4.00
Norway Shapes	4.50 @ 5.00

Merchant Steel from Store.

Open-Hearth and Bessemer Machinery,	
Toe Calk, Tire and Sleigh Shoe, base	
price in small lots	2 3/4
Best Cast Steel, base price in small lots.	8
Best Cast Steel Machinery, base price in	
small lots	5

Sheet Iron from Store.

	Black.	Common R. G. Cleaned
Nos. 10 to 16.	3 @	American.
17 to 20.	3 1/2 @	
21 to 24.	3 3/4 @	
25 and 26.	3 1/2 @	
27.	3 3/4 @	
28.	3 1/2 @	
American R. B.	4 @	4 1/4

Galvanized Sheet Iron.

	B. B.	2d qual
Nos. 10 to 16.	4 @	4 1/2
17 to 20.	4 1/2 @	4 3/4
21 to 24.	4 3/4 @	4 7/8
25 to 26.	4 1/2 @	5
27.	4 3/4 @	5 1/4
28.	4 1/2 @	5 1/2
29 to 30.	4 3/4 @	5 3/4
Genuine Russia, according to		
assortment	11 1/4 @	11 1/2
Patent Planished	10 1/2 @	10 3/4
Craig Polished Sheet Steel	8 1/4 @	

English Steel from Store.

Best Cast.	15 @
Extra Cast.	16 1/2 @
Swaged Cast.	16 @
Best Double Shear.	15 @
Blister, 1st quality.	12 @
German Steel, Best.	10 @
2d quality.	9 @
Sheet Cast Steel, 1st quality.	15 @
2d quality.	14 @
3d quality.	12 1/2 @
R. Mushet's "Special".	48 @
"Titanic"	30 @

METALS.

	Tin.	Per lb
Banca, Pigs.	22 @	
Straits, Pigs.	21 @	
Straits in Bars.	23 @	

Tin Plates.

Duty: 22 cents per pound.

	Charcoal Plates.—Bright.	
	Guaranteed Plates command special prices,	
	according to quality.	Per box.
Melny and Calland Grade.	10 x 14.	@ \$6.50
"	12 x 12.	@ 6.75
"	14 x 20.	@ 6.50
"	16 x 24.	@ 13.00
"	18 x 24.	@ 8.50
"	18 x 12.	@ 8.75
"	18 x 14.	@ 8.50
"	18 x 20.	@ 17.00
"	18 x 24.	@ 6.00
"	18 x 28.	@ 8.00
"	18 x 30.	@ 6.00
"	18 x 32.	@ 6.25
"	18 x 34.	@ 6.00
"	18 x 36.	@ 12.00
"	18 x 38.	@ 7.50
"	18 x 40.	@ 7.75
"	18 x 42.	@ 7.50
"	18 x 44.	@ 15.00
"	18 x 46.	@ 5.50
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